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Indian Architecture and Art.

IN our former glance at the valuable contents of the New India Museum our attention was chiefly directed, as far as the special information prized by the *Builder* is concerned, to the materials for construction and for ornamentation which are yielded by the mineral and vegetable products of India. We dwelt at some little length on the picture presented to the visitor of the *Flora* of that vast country, partly on account of its economical value, and partly as affording an admirable example of the mode in which one department of knowledge grades into another. Thus the engineer or architect who is in search of the best timber, or the most beautifully marked and mottled wood which can be used, either for construction or manipulation in India, or for importation to this country, will obtain a very feeble and unsatisfactory grasp of the subject of his quest, unless he knows something of Indian forestry, and something of the peculiar conditions under which the rare and precious products of the Indian *Flora* have their birth.

In that part of the exhibition of which we were compelled to defer the notice, the objects most germane to our habitual study are the specimens and representations of Indian architecture. The skill and experience of Mr. Fergusson, which are specially valuable on Indian subjects, have been wisely sought, and happily ministered, in the arrangement of a fine series of photographs, representing many of the chief architectural monuments of the East. In these, sculpture is so linked to architecture, in the guise of a handmaid art, that some account of the chief peculiarities of this branch of Indian art cannot be neglected. From sculpture, through the link of bronze statuettes and other works in bronze, the attention is led to the metal-work of India, to its exquisite filigrees, rich goldsmith's work, and abundance of precious, although rudely-cut, gems.

Ascending to the upper floor, we come at once upon a group of relics of extreme interest. It is nearly forty years since men of science in this country were made aware of the existence of what are here denominated Graeco-Boodhic sculptures; although it is for less than half that period that they have been supplied with some definite information on the subject by the Transactions of the Royal Asiatic Society. No literature, however, can supply the absence of actual specimens. A visit to those now accessible to the English artist at South Kensington cannot fail to produce a novel and striking impression on his mind. The first idea is, that all that the study of philology has lately revealed of the affinity between the Sanscrit-speaking people and the Greeks, is confirmed by relics of an art that had attained a high degree of development before the European tribes broke off from the Asiatic stem. Such, indeed, is not the fact. History and chronology, as well as the relics of the early art of Greece, contradict such a hasty hypothesis. But in the intimate blending of the Greek and the Indian characteristics, although the date must be brought down to a time subsequent to the invasion of India by Alexander the Great, there is a sure sign of kindred blood. It would, it seems to us, be impossible for workmen of one race so to identify their own motives and handling with those of another faith and habit, were not the subtle sympathy of blood present to harmonise the contrast.

Art in India, which it was once the fashion to trace back to an immense and fabulous antiquity, is now considered to have left no relics of date anterior to the reign of Asoka, about 250 B.C. Between this time and the establishment of the Mohammedan supremacy in India,—that is to say, somewhere in a range of a thousand years,—the statuary now in the Museum must have been wrought. The specimens are for the most part fragmentary; but, as far as we are able to judge, the special motive of Indian sculpture, that is to say its conception as altogether subservient to architecture, has controlled the artist. Of the presence of a strong Greek element there can be no doubt. The history of art, and the history of race, will both be luminously illustrated by the full elucidation of this remarkable group of sculpture, and by all that can throw light on its origin. We are glad to learn that specimens now in Peshawur will be sent to this country. We have before us the materials for an entirely new chapter in the history of art. The rapidity with which, in Greece, the Aryan artist sprang from the archaic conventional forms of such figures as the Apollo of Tegea, with a strong flavour of Egyptian influence perceptible in its proportions and pose, to the zenith of the sculptor's power in the time of Phidias and of Polycletus, is one of the most striking characteristics of Greek art. That a not dissimilar facility for changing type and treatment, and for seizing what was best suited to the need of the hour, has been displayed by the sculptors whose work, in stone, in terra-cotta, and in baked mud, is now to be found in the Indian Museum, there can be but little doubt. Not less precious, as matter of instruction, than our magnificent collection of the Elgin and Phigalean marbles, however in form, in grandeur, and in beauty, these Indian hybrids may hereafter prove.

The genius of Greek and of Indian art, indeed, is far from identical. In the former, sculpture, and sculpture as applied to its noblest subject, the nude human form, is the central element. In the latter, the human figure is generally degraded to a mere ornamental function. Wonderful elaboration of ornament, in which quaint and caricatured human forms act as hieroglyphics, rather than as reflections of what is beautiful, is the chief object of the Indian artist. We have examples of this, in the Indian Museum, in fine bronzes, as well as in stone and in more perishable materials. The subject demands the fullest attention; first, to collect as much as may place before us the historical sequence of this product of the mingling of the East and the West; and secondly, to write that new chapter in the history of sculpture for which the materials will be thus provided.

Akin to this inquiry we may here call attention to the fine collection of Indian arms and armour, which has been so judiciously arranged as to have not only an antiquarian, but an ethnological, interest. The mere introduction of an unusual word as the label of part of a collection may seem to the casual observer a bit of pedantry. Very differently do we read the words Aryan, Semi-Aryan, and Non-Aryan, under which the quaint and elaborate work of the Indian armourers has been arranged in the gallery. The last word, indeed, may be said to have the defect of being purely negative. But it is used, like the word *Anarien* by the French *savans*, to denote a group, large, indeed, and capable, may be, of future distribution into important subdivisions, but distinguished by the total absence of the spirit of the Greek-speaking, or Sanscrit-speaking, people. The word Turanian has been applied to the people from which these products emanate; nor can there be any good objection to the term so long as we consider it as provisional. Yellow, lank-haired hordes, with oblique eyes, prominent cheek-bones, and depressed noses, the Tartar tribes, the Chinese, the Malay, and other Asiatic stems, have a strange community of character. Monosyllabic language and Pantheistic religion belong to them. The arrangement of arms to which we refer gives another peculiarity which it is more easy to recognise in the objects themselves than to describe in technical language. There is almost the same difference between the weapons of these races and those of a pure Aryan tribe, as there is between the nervous organisation of the *mollusca* and that of the *insecta*. We might call the non-Aryan weapons amorphous, were it not that they have a certain quaint form of their own. The blades of the swords, axes, and daggers seem fitted for sudden and violent use, rather than for the interchange of offensive and defensive fight. There are no handles, such as we are accustomed to use. The reed-like form of the hilt of the Japanese sword, which is an implement on which very special care and attention is bestowed, is an instance of this. The handles of the swords of the Hindoo tribes, although too small for the grasp of a European soldier, are constructed on the same principles as those to which he is accustomed. So it is with all other weapons, if we except halberts, which seem to have a prescriptive right, at all times and among all people, to ramify into the most fantastic forms.

When the visitor has once grasped the idea of the peculiarity of non-Aryan weapons, and contrasted it with that of the Aryan arms, he will at once see how the intermediate group of the semi-Aryan arms defines itself. We dwell upon this novel branch of inquiry, because it promises to open a new source of ethnological investigation, and because we believe that ethnology is one main key to all true political science.

Indian sculpture, being, as we have said, decorative rather than statuesque, passes by slight but natural grades to ornamental work applied to other subjects than those which are architectural. The phase of religious art, to which we owe all that is most beautiful in the sculptures of Egypt and of Greece, and in the paintings as well as the sculptures, of the Renaissance, attains full development in India. The manufacture of gods for public, private, and domestic use, is no small branch of Indian art. It is said, indeed, to have been carried on stealthily by a Birmingham manufacturer, who managed to combine a reputation for orthodox propriety among his fellow townsmen, with a wealth steadily increasing from the lucrative proceeds of his idol manufacture; until the unfortunate rupture of a packing case not only declared the source of his gains, but put other people on the scent. There are ample signs of the revival amongst ourselves of an industry not altogether alien to that of our polytheistic fellow subjects. In India, however, we see idolatry,—we were about to say in its naked deformity,—but we observe that a large class of the symbols that have received worship from a very hoary antiquity, are conspicuous by their absence in the present instance. Public instruction, in fact, is here somewhat smothered by our respect for our own code of public morals.

The central idea of the religion of so many Aryan people, that of the incarnation of the Deity, is fully illustrated by many of the quaint, symbolic forms of the Hindoo Pantheon. A key to the whole is supplied in a drawing, to which we direct attention. It shows the ten incarnations of Vishnoo. Philosophically regarded, it speaks of that development and advance in organic life which, geology teaches us, has ruled since the first appearance, beneath the waters of the earliest ocean, of the simp'est living forms. The creative energy is first represented or embodied in the fish. Then in the reptilian semi-aquatic type of the turtle. Then in the terrestrial form of the boar. It is natural to those whose physiological knowledge is imperfect to place the *carnivora*, although really of simpler organisation than the *herbivora*, above them in the ascending series. Thus the Lion-god follows the Pig-god. Then appears the pigmy or little man, as he may be seen among the Bosgesmans or the Esquimaux. Sixth is the form of Ram, or the fully-developed man, apt to labour; he is armed with an axe. Next comes warlike man; Ram with a bow. Agriculture is a more advanced stage of life than that of the hunter. The eighth incarnation is Ram with a plough. Ninth comes Boodha, or the religious man. Tenth,—the hope which is not special to Hindoo mythology,—the Coming King, denoted by the inartificial couplet,

> "When Kalki mounts his milk-white steed,
> Heaven, earth, and all will then recede."

The frequently expressed form of the elephant God, although expressing an idea not foreign to some of the preceding, is not included in this series, and, as an offspring of tropical climate, must be of a different date. The excellence of the bronze work of some of these figures is of a high order.

In the work of the coppersmith we pass from the architectural details of religious sculpture to the industrial occupation of the metal-worker. The brass vessels of India are now becoming objects of domestic ornament in London drawing-rooms. Of the beautiful Bidree work, the iron inlaid with silver, for which Bombay is renowned, we have more than once found occasion to speak. The silver filigree of India is represented by some beautiful specimens in the present collection. The only European parallel for this delicate work of the silversmith is to be found in Genoa. One street in that ancient home of commerce, the Strada degl' Orefice, is full of goldsmiths' shops, in which is displayed the product of a skill which may, perhaps, be traced to an Eastern origin. But the Indian work differs from the Genoese much in the same way as that in which the earlier form of "plate tracery" in architecture differs from the later development of "bar tracery."

The textile fabrics have also been repeatedly noticed, as displayed in the Indian Courts of the International Exhibition. The richness of the carpets, some of them made of velvet, here exhibited, forms a wonderful contrast to the fairy-like delicacy of the Dacca muslin. A piece of the latter, a yard wide, and ten yards long, weighs only three ounces. The fineness of the thread which weaves it is such that nothing short of Sir Joseph Whitworth's machine could measure it. We estimate it at from the six-hundredth to the one-thousandth part of an inch in diameter, and that for this reason: the piece of muslin was passed through a ring, and the finger inserted together with it, as far as convenient. The area left between the inside of the ring, and the outside of the finger, was ·25 of a square inch. If the whole of this had been evenly occupied by the web, we might calculate how many folds must be superposed, and thus arrive at a maximum thickness of the material. It does not appear that any machinery has yet been produced that equals the human fingers, especially the fingers of women, as to delicacy of work in spinning.

The endless patience of Oriental life, where a handful of rice is almost all that is needed for the daily sustenance of a workman, and where labour may be called a drug in the market, is displayed by the conquest of the two extremes of the opposition which materials offer to manipulation. Very soft, and very hard, materials are alike difficult to work with minute exactitude. We have seen what can be done, by way of delicacy, with fibre. The opposite end of the scale is occupied by jade. This silicious substance, as hard as quartz, is formed into cups, vases, and other objects, of a thinness and a finish which rival the operations of the glass-blower. It is said, by some writers on gems, that there is a secret method of softening jade which is employed by the workers. We are not in a position to say that this is impossible, but it seems to us extremely improbable. It is rather the softening, or wearing power of untiring industry, than any chemical solvent, to which the formation of these delicate objects in so hard a substance is, we think, to be attributed. In wood, horn, ivory, blackwood stone, tortoise-shell, silver, in almost every imaginable material, the same character of elaborate work, utterly regardless of the expenditure of time, is displayed. The influence of climate on art is thus shown to be as real, if not as apparent in the first instance, as its influence on architecture. It could only be in a climate where human life requires but little to sustain it, where rugged toil is not needed to keep the blood in vigorous flow, where one day succeeds another under the same influence of depressing heat, that a style of work could be produced, or, at all events, could originate, in which the labour bestowed on a table or a chair is to be measured by tens of years of the life of the workman. It is no exaggeration to speak thus of the absolute indifference to the consumption of human labour, measured by time, which is displayed by the character of Indian ornamentation.

We trust that, in its new home, the Indian Museum will soon acquire the popularity which it deserves. Of the pains and skill which have been applied to developing the collection to its present condition, those who study it most deeply will be most fully convinced; and yet we trust that it is to be regarded as a starting-point, rather than as a goal attained; as a nucleus of a future museum, worthy in all aspects both of England and of India, rather than as a work done once for all, to be visited once for all, and to be left to gather such venerable dust as covers certain portions of other museums not unknown to Englishmen.

THE "BLACK AND WHITE" EXHIBITION.

THE fancifully-contrived ticket, with half the printing white on a black ground, admitted "private viewers" on Saturday last (the public opening being on the Monday following) to an exhibition which impressed one at first sight as the most brilliant of the three which have now been held, but which a little disappoints on a more detailed inspection. The number of rather large and elaborate drawings is greater than in the two previous years; but the proportion of works which give the real artistic value to such an exhibition, those in which the poetic element of design is set forth in its simple primary form, is less than before. There is too large a proportion of mere drawing; subjects of little interest or feeling made use of only to show how much of effect the artist can attain in the absence of colour. The rather large number of original drawings for illustrated papers show how much ability and good draughtsmanship is at the service of those publications; but drawings made specially for engraving necessarily tend to fall into a certain mechanical style, nor is it in the sphere of newspaper illustrations that we expect to find the most intellectual type of artistic thought or achievement. We should prefer to see more of artists' studies of a high class in future exhibitions here, and less of the mechanical excellence of finished drawing of inferior interest in subject and feeling.

The works which best illustrate the type of art-production for which such an exhibition is to be valued, are the charcoal studies of M. Leon Lhermitte, nine in number, in which high finish and manipulation are less aimed at than artistic effect in shorthand, so to speak. Of these two of the best are "Priests' Stalls in Notre Dame," and "A Corner of a Market-place, Brittany" (172, 194), companion drawings, in which groups of figures are given with powerful Rembrandtish effect, and with carefully-studied composition; of his larger single figures we may specially notice "An Old Woman, Finisterre" (226), as very powerful in expression, the face highly characteristic alike in its features and in the effect of half-shadow in which it is seen. In a similar category with the contributions of M. Lhermitte are those of M. Legros, whose sepia drawing of "Un Mendiant de Bruges" (92), shows the same kind of half-grotesque, half-pathetic power which we find in the sketches and studies of Decamp; and his large free etching of a stormy bit of landscape, under the title of "Le Coup de Vent" (512), is as masterly a thing of the kind as one could wish to see: the artist's power as an etcher is shown equally, in a different manner, in his "Portrait of Thomas Carlyle" (247). We have another French contribution of great merit in "The Storm" of M. Achille Dien (150), a striking little study of atmospheric effect. It is impossible not to notice how much clearer is the æsthetic perception as to the best capabilities of "black and white" media among French, as a rule, than among English artists. Among the latter we may note this year a tendency to send *replicas* of paintings exhibited elsewhere: thus Mr. Powell sends a repetition in black and white of his "Loch Coruisk" (191), the same size, and occupying a similar position at the top of the room, as the coloured drawing in the "Society of Water-colours"; Mr. Raven sends a similar repetition of "The Monk's Walk" (83) exhibited in the Academy a year or two back, and M. Aumonier a very large drawing of "The Thames at Great Marlow," nearly, if not quite, the size of the picture hanging in the "lecture-room" at the Academy. In this latter case the drawing is superior to the painting, in which the colour is not, to our thinking, fortunate; but in a general way we can hardly see what end is served by these large and elaborated reproductions in black and white of previously executed paintings. M. Roybet's etching (88) of one of the figures in his "Game of Chess" has the interest of a study; so also has Mr. Crowe's study (282) for the "French Savants" picture; in both the figures are reversed from the position they assume in the paintings. Mr. Huiber's large life-size drawings of figures, half-length, have considerable power and character, especially that of the old woman threading her needle "Encore sans Lunettes" (193). Mr. Riviere's "Midnight Assassins" (295) is a result apparently of zoological garden studies,—three lions attacking a giraffe; a cruel subject portrayed with some power. Mr. Macbeth's "Steamer waiting Arrivals from the Ferry" (189) shows fine feeling for effect, probably all the better from the artist being debarred from the use of colour; and the large charcoal drawing of a sea-side scene under the title "Shrimping" (244), by Mr. Colin Hunter, is notable for its wild and windy effect. Nr. Leitch's small sepia drawings, especially "Castelamare" (6), have a pleasing touch of the "Liber Veritatis" style and feeling about them. Mr. Ditchfield's "Study of Rocks" (47) is well worth attention for admirable and careful drawing; and in a similar spirit is the "Beach at Rottingdean" (97) of Mr. Slocombe, with its curiously buttressed rock. Mr. Bradley's little etching of "Venetian Boats" (51), Mr. Severn's "Westminster, Evening" (57), Mr. Pocock's "Road to the Farm" (215), Mr. Cole's "Ville d'Arvey" (265), Mr. Hopkin's "Study of a Wave Breaking" (275), Mr. Hall's "Pine-wood" (292), and

Mr. Glennie's small sepia drawings, are among bits of landscape study to be looked at; and Mr. Bunney's small drawings (283) are capital examples of free pen-sketching, as Mr. Brewer's "Old London Bridge" (454) is of more elaborate and finished drawing in the same medium. Among figure-studies of some importance, in regard to subject or execution, are Mr. Marks's "Wassail Bowl" (374), Mr. Cave Thomas's composition in red chalk, entitled "The Fate of Benefactors" (391), which, perhaps, hardly sufficiently explains itself, though presenting fine drawing and composition; Mr. T. W. Waterhouse's "After the Dance" (370); Mr. Hayllar's "Once a Week" and "All the Year Round" (227-8); Mr. Hicks's very spirited "Studies from Life" (366, 443); Mr. Maclaren's "Study in Red Chalk" (341) of a woman and infant; Mr. Fahey's "End of the First Volume" (430), a girl sitting lighted by lamplight, with the book on her knee; Mr. Wirgman's "Reminiscences, Schumann" (483); M. Emile Levy's "Étude de Femme Moderne" (269); and others. There are some fine specimens of reproduction in etching, especially Vibert's card-players, by M. Mongin (133), and two subjects after Toulmouche (296-8), bearing the well-known name of Leopold Flameng; and those who have enjoyed "The Land of Cuyp" in the Academy will be interested in seeing Mr. Hook on the same ground as an etcher, with a small subject of river and figures under the title "Brimming Holland" (331). Among oddities of the exhibition is Mr. Sullivan's drawing of a boating "coach" and his party coming in full swing along the river-bank towards the spectator, under the title "Settle down to that, gentlemen" (176); the subject is new and the drawing clever. The lady who, in scenes in which children act men's parts ("We never Perform out of London," 239), shows such genius in delineating that part of little boys which is *not* called the top, has perhaps given us the joke often enough. Some of Mr. Du Maurier's and Mr. Sambourne's original drawings for *Punch*, on the screen, meet us like old friends, whose humour we are very willing to enjoy over again.

FROM ROME: ABOUT THE OBELISKS.

THERE is much stolen property among the treasures of Rome, and should a day of restoration ever come, Egypt, among others, would receive many a ship-load from the Eternal City. To Egypt belong the most ancient, and perhaps, if rightly considered, the most impressive monuments to be found here. Her obelisks, disfigured though they are by the embellishments of the sixteenth and subsequent centuries, carry an expression of mysterious beauty of a far higher order than anything we meet with in works which can justly be called Roman; and the utter want of appreciation with which these obelisks have been applied, alike by her ancient conquerors and their later representatives, secures for Egypt relatively a very high place among the art-builders of the world.

The word *obelisk* means literally a small thing sharpened to a point, and there is something in the simplicity of the name, and in the strangeness of its sound to English ears, well in accordance with the object which it represents. There is a weird sublimity in those single blocks of Syenian granite which cannot be expressed. They speak to us; but their language is without interpretation. Their very history and purpose are involved in obscurity. Some have asked,—"Were they solar quadrants?" But their position beneath the shadow of the temple forbids the entertaining of such a supposition. "Were they gravestones?" No. All that can now be known must be gathered from the hieroglyphics which they bear, and from these we learn that, generally speaking, they were consecrated to the sun or to the moon, in commemoration of the founding of the temples they adorned, by the kings whose names are recorded upon them. But was this their only use? It is difficult to suppose so when we find, for instance, that the sides of one now in Rome are of unequal breadths, and that one of them is convex. Not until we are learned in all the learning of the Egyptians shall we be able to understand the purposes which they answered.

Augustus found the obelisks of Egypt standing like eternal sentinels before the dark shrines of Thebes and Heliopolis, and, giving an example of rapacity which Cæsars have been too prone to follow, commenced the exportation of them to Rome. The process was continued until the division of the Empire; and not only did the Emperors carry off the examples which they found in the conquered country, but they also compelled the inhabitants to work others in the quarries of Syene. It is not possible to think that the Romans did not admire these wonderful monoliths. They readily accepted the ancient belief that their form was the representation of a ray of light, and they expended upon their transportation much treasure and toil; but the manner in which they adapted them to the ornamenting of their city showed that they never grasped the pure ideal which these antique stones embody. Their first innovation was the placing of them upon moulded pedestals, wrought in Egypt, but only in compliance with the imperial command, and the consequent introduction of an effect of duality, whereas *one-ness* is an essential attribute of the Egyptian symbol. On those obelisks with one exception which were quarried under the superintendence of the Romans no hieroglyphics or other inscriptions are found; the hieroglyphics they did not want, and the pedestal afforded space for their own records. This omission, as may be still seen, proves absolutely fatal. It did not deprive the monument of its voice only; but of its very soul. Its motive—the reason of its existence—was gone.

In the great majority of instances, the obelisks were placed upon the *spinæ*, or central walls, which divided the circuses of Rome in the direction of their length, among *ova*-bearing columns, urns, statues, *metæ*, and other works of art. Two were placed in each circus, a larger one and a smaller, dedicated respectively to the Sun and the Moon; the former being crowned with a sphere of bronze, and the latter with a silver disk. These latter additions completed the annihilation of the spirit which had lived in the original design, and converted the structure into an inferior kind of column. One obelisk was applied to an exceptional and to a better purpose by Augustus, who raised it in the Campus Martius as the gnomen of a sun-dial. It was placed upon a base of polished marble on which were traced in bronze the lines necessary for determining the hours of the day. We do not learn whether it escaped the exaltation of a pedestal; but we can hope it did so in order to preserve the direct line of the shadow. We read in Pliny, who gives a minute account of it, that a sphere of bronze-gilt (*pyropum*) was fixed on the top.

In evil days the obelisks of Rome were, with one exception, thrown down, and, more or less, broken into fragments. So they remained until 1586, when, after a severe architectural competition, into which Michelangelo declined to enter, the reigning Pope, Sixtus V., entrusted to the celebrated architect, Domenico Fontana, the removal of the one which was still erect and entire from its original position on the *spina* of the circus of Nero to that it at present occupies in front of the basilica of St. Peter. The commencement of the work was preceded by an imposing religious ceremony; its accomplishment was regarded as a miracle. The architect was rewarded with a donation equal to sixty-five thousand crowns, and an indulgence of ten years was granted to all who, passing before this reclaimed instrument of paganism, should adore the sign of redemption, with recital of Pater Noster. But why were there blowing of trumpets and salvoes of artillery? The design is certainly not as offensive as it might be; a former Pope "conceived the grand but impractical idea of raising the obelisk on the shoulders of four colossal statues of the Evangelists, and placing on its summit a bronze statue of Christ bearing the cross"!

The composition, as we now see it, consists, commencing from the summit, of the "victorious cross," with its usual accompaniments and stays; next the obelisk itself a fine mass of red granite of Roman origin, and consequently without hieroglyphics; next a double pedestal, or rather two pedestals placed the one upon the other, both having cornices, and the lower a heavy moulded base; then the plinth of two fascias; and, lastly, three low steps. The height of the original shaft itself is 82 ft. 6 in.; the total height of the modern parts, 50 ft.! As one looks at it, covering all the lower parts with the hand, it is impossible not to think that a mistake has been made. To him who does not come ready primed to explode with indiscriminate admiration, the pile appears in danger of tottering to its fall. The lower pedestal appears to be of less breadth than the upper one, and the base of the obelisk (so much does the eye demand that the sloping lines of the monolith should terminate on a surface broader than its base); and this appearance, whether it be an optical delusion or not, produces a sense of weakness, for which the architect was assuredly answerable. Some additions which were made long subsequently to the time of Fontana add much to the look of insecurity mentioned above. They consist of most miserable heraldic lions and eagles in bronze placed at the base of the obelisk itself, which has been so recessed as to give the idea that it is resting in part on the flanks of those feeble caricatures. Fontana himself seems to have felt his mistake; for when we come to the next one he erected, viz., that in the Piazzo del Popolo, the superiority of its mounting strikes us immediately. It was brought by Augustus from the Temple of the Sun at Heliopolis, and placed in the Circus Maximus, and of course, therefore, it has the advantage of hieroglyphical inscriptions. It has the cross at its summit, and stands upon a base and plinth of small dimensions, and below them on a single pedestal with cornice and base: this itself stands upon a plinth of two fascias, and is surrounded by five beautiful Egyptian lions, each raised on a stepped pyramid, and the whole again is raised on five steps. The height of the shaft is 79 ft., and that of the additions 32 ft.; so that these latter bear a much better proportion to the whole than they did in our former instance. The pedestal, too, is considerably wider than the base of the pyramid, and we do not notice the appearance of weakness which was observable before. Fontana erected also the obelisk of the Lateran, the largest and most ancient in Rome, dating from 1540 B.C.; and that of St. Maria Maggiore; but space forbids us to follow him further.

The next obeliskic monument is an atrocity committed by the great architect Bernini. It is situated in the Piazza Minerva, and consists of a small obelisk of bluish-grey granite surmounted by the cross, and poised on the back of an undersized elephant. The trappings of the animal are rich, and it carries a kind of saddle, the slightly-raised sides of which retain the shaft in its place. Add, that the obelisk is out of the perpendicular, and that the elephant stands upon a high pedestal, and a picture is presented to the mental eye which needs no criticism.

Hard by, opposite the Pantheon, is another comparatively small obelisk with hieroglyphics. In this instance, the stone is used as a terminal to its pedestal, a position which many other objects would have occupied to greater advantage. The lower addition to the obelisk is the most gratuitous piece of ugliness ever met with. The fountain, for such it is, consists of the cross, an obelisk, a broad rectangular cincture, a rectangular (!) continuation of the obelisk with a *congé* at the bottom, a moulded base, a plinth, an elaborate pedestal in the form of a truncated pyramid of curved lines, ornamented with dolphins, tiaras, coats of arms, a rockery on which the pedestal stands, a large basin, and, lastly, six steps on which the whole are raised.

The obelisk of Monte Citorio, erected in 1792 by Antinori, is perhaps the most ungainly of all. On its summit is placed a large "globe and spike," a finial even less successful than the cross. It is of red granite, with hieroglyphics, and has been much restored. The stone is 72 ft. in height, the additions together 62 ft.! If the ancient Egyptians were right in giving to the monument such proportions as they did, those who raised it where it now stands must have been very wrong.

There are many other obelisks in Rome; but the mode of treatment is so slightly varied that they do not call for any special remark.

Enough has been said to indicate that these works, which form the chief monuments which the Popes have left in this city, stand as witnesses to prove how vastly superior to the men of more modern ages, in matters of art, was that nation of remote antiquity whose creations are now rendered ridiculous.

Opening of the New Infant School, Hertford.—The infant school recently erected in the Hertingfordbury-road, to meet the requirements for the town of the Education Act, 1870, was opened on Sunday last. The new school-house is a structure in the Tudor style of architecture, the material being red brick. The building was erected by Messrs. Ekins & Son from the designs of Messrs. Wilds & Son, at a cost of about 740l. The size of the school-room is 40 ft. by 20 ft., and its height 14 ft. The class-room is 15 ft. by 17 ft.

ANNUAL CONGRESS OF FRENCH ARCHITECTS.

THE third session of the Annual Congress of French architects was opened in the Hemicycle de l'École des Beaux Arts, on the 7th ult., under the auspices of the "Société Centrale des Architectes." M. Henri Labrouste, president of the "Société Centrale," presided, assisted by M. Guillaume, secretary of the "École des Beaux Arts"; M. Sauvage, architect, of Lille, president of the "Société des Architectes du Département du Nord"; and by M. Mallay, architect, of Clermont-Ferraud, president of the "Société des Architectes de l'Ancienne Province d'Auvergne." MM. Auguste Duvert, Paul Sedille, and Charles Lucas, secretaries of the "Société Centrale," were *ex officiis* secretaries of the Congress. After an eloquent address by M. H. Labrouste, M. Hermant, one of the vice-presidents of the "Société Centrale," read a very carefully studied scheme, of which he is the author; but the conclusions of which have been adopted by the different committees, including the governing body of the "Société Centrale." This essay has for its object to restore *the legal responsibility of the French architect* (who, according to Article 1789 of the Code Civil, is at present liable along with the contractor, being considered as no more than a co-constructor with him); and, having rejected all idea of connexion between the architect and contractor, to place the former before the tribunals in the position of a director or representative agent, subject nevertheless to certain special conditions. In spite of a scheme of a slightly different tendency, read by M. Marteau, architect, of Lille, in the name of the "Société du Département du Nord," the Congress adopted, almost unanimously, the conclusions brought forward by M. Hermant, in the name of the "Société Centrale."

The first sitting was terminated by a lecture on the "Salon d'Architecture of 1875," by M. Chas. Lucas. A fortunate innovation to be noted, which was quite a success, was, that the speaker brought before the eyes of his audience, by the aid of a number of photographs and original drawings, the works of which he spoke; among others, the Restoration of the Forum of Rome under the Antonines, by M. F. Dutert; that of the Palace of the Emperors on Mount Palatine, by M. Seellier; the "Asile d'Aliénés," by M. Louvier; the design for a "Maison de Répression" at Nanterre, by MM. Trélat and Simonnet; and an attempt at the reconstruction in the Roman style of the Basilica of St. Martin, at Tours, by M. Baillargé, &c. The eloquent criticisms in regard to each of the works exhibited, were much applauded.

On Tuesday, June 8th, the members of the Congress met at nine for a visit to the new Paris Abattoir and Cattle-market, near the fortifications, at Villotte. M. Alphand, director of the Paris Public Works, received the Congress in the name of the Prefect of the Seine, who was unable to be present, and the honours of the occasion were done, with great interest to the visitors, by M. Janvier, the architect of the building. The members of the Congress passed successively over all the different services connected with the immense establishment, and particularly admired the "cattle-shelter" (*abri pour bœufs*),—a vast shed supported on cast-iron columns, and covering an area of 25,000 mètres, and, in a more artistic way, the "Exchange," for commercial transactions. In the large room of the Exchange a lunch was given to his professional brethren by M. Janvier, who also presented each visitor with a plan of the buildings.

At two, the Congress resumed its sitting at the École des Beaux Arts, under the presidency of M. Sauvage. Some excellent remarks were made in regard to public competitions, and specially in reference to the competitions for the *Maison de Répression* at Nanterre and the *Église de Sacré Cœur*, by MM. Lucien Étienne and Paul Sedille. Several architects of departments, particularly M. Meurant, of Douai, and M. Vandenbergh, of Lille, cited special cases of great interest, and an expression of opinion on the part of M. Trélat, architect of the "Department of the Seine," and director of the "École spéciale d'Architecture," has been adopted with the object of leading to a better system of drawing up the instructions for competitors, especially by inviting architects of standing and position to take part in preparing them.

Mr. Léopold Cernesson then read a notice of the life and works of Emile Gilbert, member of the Institute, president of the "Société Centrale" from 1851 to 1864, one of the two architects of the Mazas prison, and architect of the "Maison d'Aliénés," at Charenton. This essay, in which the lecturer evinced a respectful affection for the master whose life he retraced and whose works he appreciated, strongly moved the audience, and may be considered a model at once of sobriety of style and elevation of feeling. M. Mallay concluded the sitting by explaining, with the help of a plan, the archæological excavations made at the summit of the Puy de Dôme,—excavations which have led to brilliant results.

M. Dormoy, architect, of Bar-sur-Aube, presided at the third sitting,—that of Wednesday, the 9th. M. Chas. Lucas treated, in the first place, of the Restoration of Historic Monuments and Diocesan Edifices, and, in a carefully-considered study, of which the official report of M. Viollet-le-Duc has furnished a portion of the elements, showed what was really to be thought of all the outcry that has been made about the work commenced at the cathedral of Évreux. M. Lucas even proved, by the aid of a photograph recently taken of the actual state of the buttresses, that originally they only consisted of a single flying-buttress. After a violent storm, which interrupted the sitting, M. Lucas completed his lecture on the "Salon d'Architecture of 1875." The restorations of the Château of Pierrefonds, of Mont St. Michel, the Château of St. Germain, the Jubé at Fécamp, the Château of Pau, and the Church of Argès, in Valachie, &c., works exhibited at the "Salon" by MM. Viollet-le-Duc, Corroyer, Millet, Sauvageot, Laffolye, and others, excited much interest, and will certainly make the treatment of the "Salon d'Architecture" a necessity in the future annual congresses.

We may be able to report the further proceedings of the Congress in our next.

THE LATE MR. JAMES LOCKYER, ARCHITECT.

MR. JAMES LOCKYER, of 19, Southampton-street, Fitzroy-square, who died on the 23rd of May, after a lingering illness from paralysis, aged seventy-eight, was articled to Robert Abraham, and commenced business early on his own account. He acquired a large practice as the following list of the buildings carried out by him will suffice to prove:—Paddington Vestry Hall, Harrow-road; No. 86, Oxford-street, for Mr. Nicholay (now in the occupation of Alfred Duclos, the French confectioner); and a number of other houses in the same street; the Royal College of Chemistry, in Oxford-street (illustrated in the *Builder*),—the foundation-stone of this was laid by Prince Albert in 1846; the St. Pancras Industrial Training Schools; Manufactory, for Mr. Peirce, New Bond-street, and other houses in this street; Reading-room and Library, for Mr. Nisbet, Berners-street; Nightly Refuge, Market-street, Paddington; the Southampton Offices, Fitzroy-square; Trinity National District Schools, St. Marylebone; the Gilders' Asylum, Holloway; No. 95, Wimpole-street, for Mr. Morant; the Crown Hotel, Rupert-street, Haymarket; Vicarage House, for the Rev. T. Pittman, at Eastbourne; Farm Buildings at Falconhurst, Edenbridge, for Mr. Fox; the Spa Room and Hotel at Hockley, Essex; Knowle Church, Somerset; Enlargement of Limpsfield Church; the Enlargement of Tottenham Chapel; Additions and New Front, White's Club, St. James's-street (of which a view was given in our pages); also, Extensive Alterations at Keythorpe Hall, for the late Lord Berners; at Aldergrove, Epping and at Norfolk-terrace, for Prince L. L. Bonaparte; of Skirsgill Hall, Westmoreland, for Miss Dent; at Hackney Theological Seminary; and at Kidderpore Hall, Hampstead.

Of late years he had handed over his architectural practice to his son, Mr. Gilbert Lockyer, and confined himself to surveys and references, his integrity and clear-headedness being widely known. Like many others, we had personally a high respect for his character. About eight years before his death he declined the surveyorship to the Portland Estate, feeling that his health was beginning to fail, since which time his business has been carried on by his son and grandson.

Tenders for Sewerage in Marylebone.—At the Marylebone Vestry, on the 11th inst., tenders for certain sewer works, at Little James-street, Lisson-grove, and Henry-street, Portland-town, were received, and that of Mr. Cricket, for 1,084*l.*, was accepted.

AN OPENING FOR THE UNEMPLOYED.

SIR RICHARD TEMPLE, in replying to a letter from the projectors of a Science Association in Bengal, in which they asked support, drew their attention to "the demand which is springing up in all parts of Bengal for land-surveyors, for civil engineers, for geological surveyors, for foresters, for gardeners of a superior description, for persons versed in scientific agriculture, for carvers in wood and stone, for architects, and for many other sorts of men possessing scientic and artistic culture." The Lieutenant-Governor of the province went on to say that the more such persons increased in numbers and abilities, the more would the resources of the country grow, and the more would employment expand. Thus one cause would react upon the others. The fact of trained men being available on the spot would render enterprise profitable, and the success of such undertakings would cause occupation to offer itself to those who sought it. Sir Richard Temple's great desire is to induce educated East-Indian youths to adopt such professions as he indicated, instead of continuing to crowd into the public service and the bar, which are fast becoming overstocked, and cannot supply the means of livelihood for all the candidates who flock to them. The Eurasian cannot compete with the Anglo-Saxon; and if, on investigation, the prospect of success proves all that Sir Richard Temple has painted, some British members of the classes he has specified may think it worth while to accept his hint.

A PRESENTATION AT THE ROYAL ARCHITECTURAL MUSEUM.

ON Wednesday last a meeting was held at the above Institution to present a testimonial to Mr. Francis Child, under whom, for some time past, the drawing and modelling classes have been conducted.

The chair was taken by the president, Mr. Beresford Hope, M.P., who, in a few kind remarks, called attention to the great benefit Mr. Child had rendered to the Institution by his valuable, though honorary, services, for which he had sacrificed much of his time, and to which he had shown most indefatigable attention. The president then presented him with a gold watch and chain, the former containing this inscription:—"To Mr. Francis Child, for Services rendered to the Art Classes of the Royal Architectural Museum. Presented by the Council, May, 1875."

Mr. Child, in returning thanks, said that the work he had undertaken had always been a pleasure to him, since he felt that the art classes of the Architectural Museum were really furthering the cause of technical education among workmen. In the art manufacturers' workshops he more often saw students from these art classes than from the more important classes at South Kensington or the schools of art.

THE SANITARY STATE OF TIVERTON.

WE have received the following letter:—

"Sir,—I have just seen a paragraph in the *Builder* of the 12th inst., under the above heading. If you will read the *Tiverton Gazette* of the 15th inst. you will find that the persons you refer to as having been "killed," were not living in, but nearly a mile and a half from the town of Tiverton, and were "killed," to use your own word, by the negligence of their relatives; the whole matter being this, that the pump and well belonging to the house were out of order, and instead of getting them repaired they chose to drink water from some out-of-doors dipping-place.

If the Sanitary Authority ought to have found out that that pump and well were out of order, and seen to the repair of the same, then, and then only, will I admit that some blame attaches to the Authority for not having entered the residence in question and tested the water.

Now that we have Rural and Urban Sanitary Authorities, it appears to be the notion of some people that everything ought to be done at the expense of the rates, and that nobody ought to die.

The Sanitary Authority of Tiverton may well ask itself,—'Am I God, that I should kill and make alive'? C. M. HOLE, Town Clerk."

If we are to judge from this letter, we know more as to the state of parts of Tiverton and its neighbourhood than the town clerk, and would suggest to him the necessity for a little

careful inquiry. The Sanitary Authority of Tiverton have certainly power to kill, whatever their ability or will in the other direction may be. We should have been glad to find indications of a rather different spirit in Mr. Hole's letter.

It will scarcely be believed that the town clerk had written two days before to the Local Government Board:—

"The Sanitary Authority have only to add that in consequence of the very unusual epidemic of scarlet fever which has occurred, they have the instructions of the Council to consult some engineer of experience, with a view to render effectual the water supply and drainage of the town, and they will be prepared to carry out any well-considered plans which may be advised for the benefit of the public health."

And that the Medical Officer of Health has reported that during the months of April and May just past there have been seventy-two deaths, while the average of the past five years would make the number thirty-seven! Was it not quite time for us to point out that "A number of people have been killed off before their time, and a larger number made ill, through the want of proper sanitary arrangements in Tiverton and its neighbourhood"?

ANOTHER LARGE RAILWAY STATION.

THE awkwardly-situated station at Dunlop-street, Glasgow, is to be improved away, and a new structure for the use of the Glasgow and South-Western, the Glasgow City Union, and the Midland Railways is already commenced in its stead. As a fitting terminus for the Midland Railway in Scotland, the St. Pancras Station is to be reproduced with all its bold features, but on a somewhat reduced scale. The length of the new station is to be 522 ft., but instead of a span of 240 ft. as at St. Pancras, the span at Glasgow is to be 198 ft. Owing to the arrangement of the side walls, the main ribs cannot conveniently be placed so near together as at St. Pancras. The purlins, because of their greater length, require, therefore, to be proportionately stronger. The principal difference which will strike the eye is in the diagonals forming the lattice of the main ribs, the Glasgow ribs having only a single triangulation instead of the double or cross triangulation at St. Pancras.

The engineer is Mr. J. F. Blair, while Mr. Milroy represents the contractors, Messrs. Thos. Brassey & Co., who have been for some time past engaged on the adjacent railway work.

The construction of the roof, in which there will be about 900 tons of iron, has been entrusted to Andrew Handyside & Co. (Limited), of Derby and London, who have already built roofs for the large terminal stations of the Midland Railway at Bath and Liverpool.

ACCIDENTS.

DR. HARDWICKE held an inquest, on the 14th inst., at the Bank of England Tavern, Paddington, as to the death of Samuel Odell, aged 34, a labourer, in the employ of Messrs. Kirk & Randall, builders, of Woolwich. The deceased was engaged in pulling down a wall 12 ft. high in Nightingale-street, Lisson-grove. Suddenly the wall gave way, carrying with it the hoarding. The deceased was conveyed in an insensible state to St. Mary's Hospital, where he died, eight hours after admission, from a fracture of the base of the skull and injury to the brain. The jury returned a verdict of "Accidental death."

On the 11th inst., a bricklayer named John Evans, whilst employed by Messrs. Smith & Hewit, of Old-street, St. Luke's, on a scaffold erected at the Midland Railway Goods Station, at Agar Town, slipped and fell to the ground, a distance of some 20 ft. to 25 ft. He was picked up in an insensible state and conveyed to the Royal Free Hospital, where little hopes were entertained of his recovery. He was suffering from severe concussion of the brain, one of his shoulder bones was crushed to pieces, and his ribs were severely fractured.

On the same day James Welch, aged 44, a labourer, fell from a scaffold on which he was employed a distance of some 6 ft. or 7 ft., and so severely injured his ankle that he was admitted to the Royal Free Hospital.

At Ramsgate, on the 12th inst., a number of men were at work on a high scaffolding, when suddenly it gave way, precipitating the workmen to the ground. Some escaped uninjured, but four of the men were fearfully hurt, and one shortly afterwards expired.

At Peckforton, Cheshire, on the 11th inst., Mr. Churton held an inquest, touching the death of a labourer named Hewitt, at Peckforton Castle. It appeared that the deceased, with others, was removing ivy from the lodge tower, and while a ladder was being shifted he clung on to a chimney, the cope-stone of which gave way, and precipitated him a distance of 40 ft. to the flags below. The deceased was picked up in an unconscious state. Death subsequently ensued. The jury returned a verdict of "Accidentally killed."

On the 10th inst. an accident happened at the Steel and Plant Company's Works, Newton Heath. A number of men were working in the "converting" house, when the roof suddenly fell in. A man named Jackson Longhorn had two fingers taken off his left hand, besides being otherwise injured; and James Phœnix was severly injured about the head. They were removed to the Infirmary. A boy named Bywell, was carried home, but he appeared to be suffering most from fright.

WATER SUPPLY AND SEWERAGE WORKS FOR ALCESTER.

AT the last meeting of the Sanitary Authority, in consequence of Dr. Ballard's report upon the present defective state of the town as regards sanitary matters, it was unanimously decided that Alcester be included in the list of places for which urban powers are sought. It was stated that it was probable that the town would have to be constituted a special drainage district; and ultimately it was decided to instruct Mr. E. Pritchard, C.E., of Warwick, to report to the sanitary committee on the best and most economical method of providing suitable works of water supply and sewerage.

Ashwood Bank, Worcester.—Last week, after a long inquiry, Major Tullock, R.E. (one of the Local Government Inspectors), inspected the proposed drainage district of Ashwood Bank, and he desired the clerk to inform the sanitary committee (Alcester) that a modification of the proposed system might be made, and that it would be better to call in the aid of a practical consulting engineer for advice as to what should be done, when it was decided that the services of Mr. Pritchard be secured to advise the sanitary committee upon such subject.

SCHOOL BUILDING NEWS.

Barnet.—Queen Elizabeth's school, which is a grammar school established by charter of Queen Elizabeth in 1573, and which has undergone reconstitution and enlargement under a new scheme by the Endowed Schools Commissioners, has been re-opened. The old building consisted of a quaint old hall (built at the time of the foundation of the school) and master's house, which were in a dilapidated condition. This hall, which will now be used as a dining-hall, has been restored to its original dimensions, with a new Elizabethan front at the east end. The new buildings, which are erected in a free Elizabethan style in keeping with the remains of the old school, consist of a master's house, built of brick and roofed with plain tiles, and with bay windows, timbered porch, and open hall and staircase. The new school buildings are connected with the old hall by a committee-room and laboratory, and contain four large class-rooms (two downstairs and two upstairs), with open-timbered roofs and broad staircases. Each room measures 26 ft. by 19 ft., and 15 ft. high, and provides space for thirty or forty boys under one master. They are furnished with desks and seats with backs, and are well lighted, the light being so arranged that it should always be on the left of the boys; and the gas-burners are placed in the same position. The architect is Mr. William White, and Mr. William Carter, of Holloway, is the builder. The cost of the class-rooms and the head master's house, with fences and various offices, is 4,000*l.*, to which sum must be added another 1,000*l.* for the purchase of land and levelling and gravelling play-ground, &c. The play-ground is a large one, an acre of land having been purchased for the purpose.

Goudhurst.—These schools, which have been built, according to the requirements of the Education Department, to hold 100 infants, and 150 boys and girls, mixed, were opened on the 17th ult., by the Rev. Julius Deedes. The schools, with two houses, are built on the site of the old grammar-school, of red brick, with light-coloured tiles, designed by Mr. Morris, of Bedgbury. There are two class-rooms, and an infant school, 36 ft. by 22 ft. The contract was taken by Messrs. Marshall & Cramp, of Cranbrook, for 1,900*l.*, including all fittings. Provision has been made for 215 children, at a cost of 2,000*l.* The buildings stand back from the road, and are rather hidden by houses, but are open to the south, and look over the valley to Bedgbury.

Newbury.—New schools in connexion with St. John's Church, provided by the vicar's father, Mr. Morgan, at a cost of 3,000*l.*, were opened by the bishop of the diocese, on the 12th inst. The buildings were erected from a design furnished by Mr. J. H. Money, architect, of Speenhamland, and the style is an adaptation of the Domestic Gothic. The building is entered from the Newtown-road, by a porch and lobby, leading to the school-room, the clear dimensions of which are 55 ft. by 22 ft. There are also class-rooms and requisites for carrying on the work of education among the poor children of the district. The contractor was Mr. W. G. Adey, of West Mills.

Morton.—On the 8th ult. the foundation-stone was laid at Morton of a Congregational Sunday-school. The designs for the new building have been prepared by Mr. J. B. Bailey, architect, Keighley. The school will be 40 ft. in length by 28 ft. in width, and will be capable of accommodating 250 scholars. There will be three large class-rooms and a vestry. The cost of the building, &c., will be from 650*l.* to 700*l.*, towards which sum the congregation have subscribed a little over 400*l.* The contractors are Messrs. Hartley, Morton, masons; Mr. John Taylor, Morton, joiner; Mr. Newbould, Keighley, plumber; Messrs. Thornton & Son, Bingley, slaters; Mr. Eli Sharp, plasterer; and Mr. C. Dawson, Bingley, painter.

Abbot's Bromley.—On the 27th ult., the first stones of new school buildings and a Memorial Chapel, about to be erected in connexion with St. Anne's Middle-class Boarding School for Girls, were laid. The school, which is under the direction of the Provost and Fellows of SS. Mary and John's College, of Lichfield, is intended to provide "religious and useful learning upon a sound and accurate system, and at the same time to prepare girls for the homely duties of life." It is contemplated to enlarge the premises so as to allow of the reception of 100 girls. The new school buildings will extend some distance in line with the present house, and then be projected forward at a right angle to it. They will be three stories in height, the lower floor being appropriated to general school and class-rooms, and the upper floors to dormitories, bath-rooms, &c. The chapel when completed will form the third side of a quadrangle. The portion of it first to be erected, viz., the choir and sanctuary, is to be raised as a memorial of the late Miss Lowe. The chapel will be in the Early Decorated style, and built of bricks 2 in. only in thickness, similar to those commonly used in Belgium. Its height, to the apex of the roof, will be about 50 ft. From the chancel step to the east wall of the apsidal termination of the sanctuary will be a length of 25 ft., with a breadth of 20 ft. For the present the inside walls are to be left rough to the height of 15 ft. to allow hereafter of mural decoration. Mr. Carpenter, of London, is the architect; and Messrs. Espley & Son, of Stafford, are the builders. The contract for the choir and sanctuary will be about 1,000*l.*

Llanfachretts, near Dolgelley.—Some additions have recently been made to the national schools at Llanfachretts. A new schoolroom, 20 ft. by 16 ft., with gallery, has been built, and a master's residence, consisting of parlour (16 ft. by 12 ft.), kitchen (12 ft. by 10 ft.), and three bedrooms, with the usual offices. The roof of the school is of trussed-rafter construction, stained deal, lath-and-plastered at back of rafters. The walls are built of very hard local limestone, which is obtained in large blocks roughly squared, the quoins being of the same material. The roofs are covered with Portmadoc slates, the ridges being composed of red tiles. The dressings are of Wrexham stone. The cost of the work (about 500*l.*) has been defrayed by Mr. John Vaughan, of Nannau, Dolgelley. Mr. Edmund B. Ferrey was the architect.

Eye (Suffolk).—The Grammar School of Eye, founded about 1566, being in a dilapidated condition, and the want of a good middle-class school being felt, it was resolved to restore the old school-house, render it suitable for the residence of the head-master, with accommodation for boarders, and to build a new school-room; and by legitimate restoration the tumble-down building has been turned into the quaint

open timber house that is now to be found in its place. When the work of restoration was taken in hand by the builders, the first thing was to reduce the walls and roof to a skeleton, leaving nothing standing but the timbers of the walls and the principal beams of the roof. The skeleton has been simply restored and filled in afresh, and the beams which supported the floor of the upper story three centuries ago serve that purpose still, so that the school-house is still the house in which the school was first held. The upper story projects, and new wood in the projecting beams that support it is a rarity. On the churchyard side of the building are three oriel windows to the first floor, each having a carved oak corbel. The oriel window in the gable facing the street has a corbel on which the arms of the borough of Eye are carved. The chimney-shafts of red brick are in keeping with the style of the building. The interior of the old house has been rearranged, and besides providing accommodation for the master and his family, there is room for about fifteen or twenty boarders, convenient offices have been built, water laid on to the dormitory, and a spacious day-room for the boarders built out at one side. A gravelled space, separated from the road by open oak gates, and leading in the rear to the playground, runs between the school-house and the new school-room, built of red brick, with a high-pitched tile roof, and with stone dressings, to the windows. This consists of a large school-room, 36 ft. by 18 ft., with a class-room 18 ft. by 16 ft. in the rear. The gable faces the street, and here is the main entrance—a lean-to porch of timber, which forms a lobby. The spandrels of the doorway are carved, there being on one side the arms of the Honour of Eye, and on the other those of Sir E. Kerrison. Mr. J. K. Colling, of London, was the architect; and Messrs. Vine & Day, of Eye, the builders.

Hillsley (*Wotton-under-Edge*).—New schools have been built in this village. Mr. Hale, the lord of the manor, provided a site, and gave the stone for building, in addition to subscriptions towards the building fund. The schoolhouse and playgrounds occupy about a quarter of an acre of ground, and are situated on the right of the road to Kilcot as it enters Hillsley. The schools are from designs by Messrs. Medland, of Gloucester, and form a square building of about 51 ft. by 49 ft., rising with a gable end in the middle of the front of the building, and covered with Bridgwater dun-colour tiles. The interior consists of two rooms—an infants' room, 30 ft. by 16 ft., fitted with gallery, and a lobby at each end. A larger room for the elder children runs the length of the building, giving an interior measurement of 47 ft. by 18 ft. This is divided if required, by curtains, to separate the girls' and boys' school, and is fitted up with pitch-pine desks, upon Sidebotham's patent standards. The woodwork is stained and varnished. The cost of the building, exclusive of stone and ground, was 400*l*. The masonry was executed by Mr. G. Werrett, of Hillsley; Mr. Bloodworth, of Dursley, doing the woodwork.

THE ARCHITECTURAL ASSOCIATION.

AT an ordinary general meeting of the Association, held on the 11th inst., under the presidency of Mr. Birch, Messrs. Wm. Eade, Wm. Jacques, and G. R. Desgrane were elected members.

Votes of thanks were accorded to Mr. Perrott, the engineer of the Floating Swimming Baths, and to Mr. Croad, the clerk of the London School Board, for the facilities these gentlemen afforded on the occasion of the recent visit of the members to these places.

The president said that with regard to the proposed fusion of the Architectural Association and the Royal Institute of British Architects, he believed that the secretary had some communication to make to the meeting.

Mr. S. Flint Clarkson (Hon. Secretary) then read the following "message" from the committee of the Association:—

"11th June, 1875.

"The question of the possibility or advantage of a fusion between the Royal Institute of British Architects and this Association was brought under the notice of the committee, when they were informed that the special committee on the affairs of the Institute had appointed a sub-committee to confer with a sub-committee of the Association on the subject. A sub-committee of members of the Association was accordingly appointed, and the sub-committee have met and conferred.

The following report, dealing with the questions referred to them by the committee, has been furnished by the sub-committee. In submitting it to the members of the Association, the committee desire to express their general approval of its contents, and to state that they wish to co-operate with the Institute in every possible way, keeping clear of any attempt to rival that body. It will always be their endeavour to induce the senior members of the Association to become members of the Institute."

"*To the Committee of the Architectural Association,*
4th June, 1875.

Gentlemen,—We beg to report the result of our consideration on the subjects referred to us by the committee in the resolution of the 16th April, 1875.

1st. With reference to the suggested fusion of the Royal Institute of British Architects and the Association.

We have taken into consideration the scheme suggested by Mr. T. Chatfeild Clarke, which has been already reported to the Committee of the Association, and it does not appear to us such a fusion would be either desirable or possible. We consider that it would imperil the usefulness of the Association, owing to the control under which its work would be carried on, and so radical a change in its constitution might paralyse its energy for years. We cannot recommend the members to part with their present independence of action, in which we recognise one of the means by which the Association has attained such great success.

We are fully aware of the advantage that would be gained by a joint and unanimous action of the whole profession in securing and maintaining professional status, awarding honours, promoting education, and accumulating the results of study and experience; but such united action does not at present appear possible, and it is unnecessary to speculate as to the future.

2nd. With reference to the question referred to us, 'whether a scheme on the basis of co-operation rather than fusion is worthy of consideration':

We are of opinion that there is no desire on the part of the Association to stand apart from any action by the profession or the Institute in which the Association can render any assistance; nor do we anticipate any such disposition in the future. The relation between the two societies is quite free from any antagonism or rivalry. Still, as each Society has, and should keep to, its special sphere of action, co-operation could only take place in such matters as:—(A) An interchange of invitations, by which members of either Society would be at liberty to attend lectures or other general meetings of both Societies; and, occasionally, joint meetings of the two Societies might be held for the discussion of suitable subjects; (B) the abandonment by the Institute of its class of students, the Association being recognised in the place of the same, and assisted by such influence and privileges as the Institute can give to it; (C) the joint use of the libraries by the members of both Societies,—that of the Institute for reference, and that of the Association for circulation, with such arrangements as would secure the extension and best use of each; (D) joint action on the part of the two Societies in order to obtain a better system as to awarding prizes.

Other similar modes of co-operation might be suggested, which could be carried out without affecting the independent existence of either Society; but any attempt to obtain an official connexion between the two Societies would not materially assist either, whilst there might be danger of the less powerful being injuriously controlled, or of a collision of opinions or interests.—We are, gentlemen, yours faithfully,

(Signed) GEORGE H. BIRCH,
JOHN S. QUILTER,
BOWES A. PAICE,
S. FLINT CLARKSON,
EDWARD G. HAYES."

Mr. Quilter announced his intention at the next meeting of moving a resolution affecting Rule 5 of the Association; after which several officers were nominated to serve on the Committee for the next Session, the president for the year proposed being Mr. J. S. Quilter.

Mr. S. Flint Clarkson stated that the annual dinner would be held on Wednesday, the 30th inst., at the Holborn Restaurant; and that the annual fortnightly excursion of the members would start on the 30th of August. With regard to the Saturday afternoon visits, the last of the season would take place on the 19th inst., when the members would visit Christ Church, Westminster Bridge-road.

Professor Lewis then read a paper on "What a Student's Course in Architecture should be," a report of which we give below.

"WHAT A STUDENT'S COURSE IN ARCHITECTURE SHOULD BE."

PROFESSOR LEWIS, after a few introductory remarks, said that he would, in the first place, ascertain clearly the objects to be aimed at, and then see how students could best work up to them. He assumed the common case of a youth, fond of drawing, charmed with the picturesqueness or splendour of our grand old buildings, or ambitious of the distinction to be acquired by designing new. In his views every feeling was subordinated to that of the artist. All his training, so far as his inclination went, was limited to that. Then he found, when he came to the real working life of an architect, that he had painfully to work up again many a branch of study which he had abandoned before he knew how it would aid him in the profession which he chose. The classics, for any branch of it beyond the mere routine; mathematics, for calculating the strength of materials and their strains; the rudiments of the physical sciences, for understanding the nature of materials; and so on. Or, take the case (more common, perhaps, and more to their purpose) of a youth or his parents, who had clearly before them the fact that much beyond an architect's training would be required; but, uncertain as to the amount of knowledge that would be wanted, or the steps by which it could best be attained. Now, in the first place (and the point was of more real importance than perhaps it appeared to be), they wanted to take their place in society on equal terms with the members of other professions, and to do this they must equal others in knowledge, who had a concise test as to what that knowledge was expected to be in the subjects given for examination at the entrance to them, no matter what the profession might be. The army, the law, medicine, each examination showed that its members were expected to have some knowledge of classics and modern languages, mathematics, and the physical sciences, English history, and literature. In special cases, such as the Indian Civil Service College, and for the Royal Artillery and Engineers, the examination was very severe, and a good knowledge of drawing was also required. But the list which he had given above was suggested, if not absolutely required, in all. They might say that all this was true, but that an artist held his position in society by his artist work only, and if that were worth the having, he kept that position, whether he were learned or not. But the Association would all bear him (the speaker) out in saying that in most cases they met in an accomplished artist an accomplished gentleman; and he need scarcely say that one at least of the leaders amongst the artists might almost lay claim to be a worthy successor to the Admirable Crichton. He assumed, then, the necessity of an education equal to that of those with whom they were most likely to meet in the world as friends or as clients. Now, how was this knowledge to be obtained? He supposed, again, the question to be asked by the parent proposing to bring up his son essentially as an architect, was that he believed all that was then wanted for the young intended student was the ordinary education of an English gentleman, supplemented with some special instruction in drawing, and somewhat more in science than was usually given. He should be sorry to think otherwise; for of all the modes of cramping genius, he believed an absolutely technical school to be about the worst. Obtain first, he went on to say, a good primary groundwork in knowledge generally, and let technical work come after. To go one step further, his decided feeling was that nowhere was this primary education to be so well acquired as at their great universities. He knew their shortcomings in the matters of drawing and science. But all this was being amended, and when they had seen Sir Digby Wyatt a professor at Cambridge, and witnessed the brilliant success of Mr. Ruskin at Oxford, they might be sure that art would receive more care there than ever it had before. Anyhow, be it little or much, as much attention was paid to art and science at the universities as they were likely to find elsewhere. He did not say that in passing through them any one *must* have obtained what was wanted. To many, no doubt, all training there was useless, so must *all* training anywhere be to many; but college life implied discipline, tests by frequent examinations, contact with clever men, and an atmosphere, if he might so express it, of learning, which could not be obtained elsewhere. He might be allowed to speak of his own experience after what might be called, he supposed, a tolerably successful career; and the greatest want which he had felt, and felt bitterly many a time at his first start in life, was his not having been to a university. He told them fairly that some amongst them who had been there, did not value it as he did. He spoke simply from his own experience in the particular path of life in which it was gained, and in which most of his fellow workers were university men. He knew, too, that university life necessitated a later start in the strictly professional life than would otherwise be required. No doubt it did; but he did not believe that the time was wasted. No one would trust a youth with work worth having until years after college life had ended; and they might depend upon it that three years time of study in early life would prove of incalculable value afterwards. In a public school there were, of course, much the same opportunities of study as at college; frequent examinations as tests; and something of the same prestige in after-life as a university gave. But, as to schools generally, he could say nothing, simply because their status varied in every conceivable way, both as to the kind of knowledge given and the way of giving it. No doubt there was little special training anywhere; and an amusing instance, bearing directly upon

his subject, was given in the last report of the Cambridge examiners. They examined 4,283 boys and girls at 114 centres, so that the range was a large one; and, as an instance of what an architect would learn in the way of drawing, they noted that many candidates drew without the least regard to the rules of perspective, and that many who had evidently heard that certain lines ought to converge to a point, proceeded to make them do so accordingly, but with remarkable rapidity. And what an architect would learn as to his common work might be seen by another question, viz., what quantity of paper would be required to paper the sides of a room of a given size and height? Thereupon almost all the girls, and many of the boys, set to work at once, either to find the area of the room or its cubical contents. Now there was nothing difficult in the question. Arithmetic and drawing had simply been learnt parrot-like, and no attempt had been made to adapt their working to the common uses of life. Such, no doubt, were the shortcomings of the schools in which most of their young architects, so far as he could see, must be educated; but the mere fact that such shortcomings were now brought to light was an earnest that they were likely to be amended. Now, as to the student, when he began work—he said nothing now as to their English system of pupilage as compared with the foreign one of the Academy—pupilage was that to which they were accustomed, and whether it was best (and he confessed that he thought it was) or not, they must take it as they found it. Now what did a student learn in an architect's office? So far as teaching went, he had commonly found, though there were no doubt bright exceptions, just nothing. No one as a rule taught; the pupil simply picked up what he could from the work that was going on in the office, and from his fellow pupils or assistants there, having at rare intervals a little bit of advice and instruction from his master. He spoke feelingly, for he had *none*. The drawings and specifications on which he had to work were, for the most part, dry and well nigh unintelligible to him, and if he had entered the profession with enthusiastic feelings in respect to it, his ardour too often got damped at the outset. Was this beginning of the technical education right? He thought not; but the fact was as he had stated; and so let them learn what was to be acquired out of the office. Undoubtedly, first, the power of being able to draw from the buildings which they ought to study, and then open out to themselves the secret of their beauty, was the reverse. He said nothing now of drawing from the life—the finest way no doubt to train the hand and the eye to the perception of what was most beautiful in form. Now not only in drawing could they realise to themselves the secrets of the design, but in sketching a building or a detail in the way in which it ought to be sketched, they could not fail to perceive which were the most important of the outlines, how the skeleton was filled up by the ornaments added to them, how the whole system of the construction was carried out, and how for themselves they might produce such effects in their designs. In no way, so well as by a careful drawing of the thing itself, could they ascertain this. He did not say that good sketching must result in all this. A man might have the power of appreciating the beautiful, but the power to create it was vastly different, and the above result might, perhaps, not be gained. But sure he was that no one was able to design (except by chance) a thing worth looking at, unless he had mastered the principles on which such things should be done, and no way was so likely to lead him to this as the habit of carefully sketching, first to get the perspective effect of the masses, and then, if need be, by measured drawings, worked to scale on the spot. He was pleased to see that the silver medal of the Institute, and the Pugin memorial prize, were usually well competed for, as the requirements of the competitors for them, as carried out by the Institute, gave just what seemed to him to be wanted. And, in speaking of sketching, he would ask them to take from him a few words of advice, which long practice entitled him, perhaps, to give, and which, no doubt, had already regulated the practice of most there—never alter or add to a sketch unless the actual thing sketched was before them. They never could be sure that in what was called finishing a sketch they had not added or omitted something, trifling it might, perhaps, seem at the time, but possibly important after all. Make pretty copies if they thought it worth the trouble, but leave the original untouched. Let them use themselves to sketch without compass or rule, except, of course, in measured drawings, and they would find that they would soon be able to do without them, and their work would be more free, and, in the main, more true. Now to work out what he meant of the extreme value of sketching. First, they must, from absolute necessity, get the general outline, and thus they could study the effect of the mass, irrespective of details, much as they did when they studied an outline, boldly marked out by moonlight against the sky, whilst its details were hidden by the gloom. No one could draw a graceful outline thus without its giving him a practical lesson in design. Then came the important details of doors and windows, showing more delicate contrasts of light and shade. Put in the joints of the masonry or other work, and they had the construction. Then came the ornamental parts, and these would show how the constructive and other main lines were emphasised, not hidden; and thus they got the whole history of the structure in their minds, whilst its likeness was being formed by their pencils. He thought so very much of the effect of sketching in the training of a young architect that he had ventured to bring a few sketches here of his own, not as possessing any artistic merit, but serving only to show how easily rule and compass might be dispensed with after a little practice. He would advise them not to lose any opportunity of sketching, and of measuring and drawing details to scale on the spot. Most of the eminent architects had sketched through their whole career, and the members of the Association could not do it too much. He must decline to enter into the invidious question as to where power of freehand drawing was acquired, but one exception to this he could fairly make in the Royal Academy. Wherever else they might study, the Royal Academy would always be the fountain of honour in art, and to become one of its students was one thing to be aimed at by every young architect. He knew well that his own first start in life was given to him by one of its medals, and Mr. Spiers and Mr. Watson would doubtless tell them much the same. He knew its shortcomings; and the success of Professor Poynter's Slade school was an emphatic protest against them. But in architectural drawing, simply, they had at the Royal Academy, a colleague, Mr. Spiers, in whose zeal and talents they might safely rely on doing the best that was likely to be done for them. Once in the Royal Academy its prizes and all its sources were open to them, and they got there much that they could not obtain elsewhere in most departments of art. In drawing from the life and from the antique, he believed, however, that Professor Poynter's school was pre-eminent. As to the history and literature of architecture and the elements of construction generally, he would much like to have said something as to the lectures at King's and University Colleges, and he purposely had this lecture postponed because it was his intention to resign his professorship at the end of this session, and then he could have spoken more freely,—of his own part, at least. For various reasons he had not done so, and thus his mouth was well-nigh stopped as to this. But he might say this much, had he known of these lectures when he was a pupil, and had gone through such a course as that of Professors Donaldson and Kerr, and had these gentlemen pointed out to him the leading facts which he ought to know, they would have suggested many a subject of which he was well-nigh ignorant until long after, and thus saved him a vast deal of groping in the dark, and have taught him, with a little exertion in early life, much that only came to him afterwards by experience, and often dearly bought. He spoke now only of the history of their art, not design. That at least was a delicate thing to try to teach. On the one hand, teaching might lead to an academic formalism; on the other, a habit of regarding too much the details of a style, and thus working in a narrow and contracted way. In this matter of art he knew of no such admirable way of learning as that for which they owed so much to Mr. Edmund Sharpe. Under such a guide, with the opportunity of seeing a building under different aspects of light and shade, and from various points of view, not only could the varying effects of perspective be studied, but the value of every detail was brought home to the student in a way which it would be hopeless to expect from any lectures in a room. With regard to the more practical part of the subject, he knew well how a youth, looking at architecture merely as one of the Fine Arts, felt how like drudgery it was to turn for a time, however small, to study, however slightly, so dry a subject as mathematics. Very joyous to the student must be Professor Huxley's idea of it, and he (Professor Lewis) quite admitted that their grand old groined roofs, and other triumphs of Mediæval construction, were achieved without their aid. But then they could not ignore the fact that this construction was perfected by repeated trials and repeated failures, which established those rules which modern science had reduced to a matter of rote; and he must be blind indeed to what is passing around him who would attempt to vie with the bold construction of the engineers, and yet ignore the science by which alone that bold construction might be safely tried. In this matter of construction the want of supplemental teaching was equally great as in drawing; but it was not easy to suggest the proper mode of supplying it. Special courses of lectures upon the various subjects to be studied seemed to be the most obvious one; but he was very doubtful as to whether they were not over-lectured as it was; and, in any case, he doubted their meeting the requirements needed. His own view was that they wanted something that would come more home to them, and it was for that reason that he originally took the clauses in an ordinary specification as the basis of the more elementary of his college lectures. But anything of this sort seemed to him to require to be supplemented by something which would bring the student face to face with his actual work, and his view was that this would best be done by extending the system which had already been of much use here, viz., of visits to large buildings in progress, not looking upon them as mere matters of pleasure, but as genuine practical lessons, given with the working examples before them, by a thoroughly competent person, who should make a complete analysis of materials and construction as much a matter of business as though he were in a lecture-room. Supplement these by visits to iron foundries, brickfields, workshops, and so on, still under skilled guidance, and then have the formulæ and other such matters worked out here as a wind-up in a way somewhat of lectures and teaching. The lecturer must, no doubt, be a paid one, and the work would be too great for the Association to undertake; but he thought that it might well be tried by the Institute, and be of more value and interest than any series of ordinary lectures; and this system, if approved, might be afterwards worked in the country also, and so give to students much greater opportunities than they at present possessed for acquiring knowledge. They wanted then, so far as he could see, as a supplement to their office work,—first, such lectures as could be given at college to explain the history and principles of art and construction in a large way, thus receiving a clear, general view of the subject; and then have the details worked out on the spot, item by item, in a thoroughly practical manner. Their own system of classes, by which they could test their knowledge with each other, would supply the rest. Now, as to the examination. He took a special interest in this, not only as having been one of the earliest examiners, in company with Sir G. G. Scott and Mr. Ashpitel, but because it so happened that it was during his hon. secretaryship at the Institute that the Council put the examination forward as a definite object of the Institute to work out. Now he knew well the objections to it, and the shortcomings of all examinations,—those at least conducted on the English plan. No doubt they narrowed to some extent the study of any particular subject, and led to a system of cramming for any one part of it selected. So much he fairly knew was this the case, that every examiner of large practice soon found out that if, *e.g.*, he suggested for any subject a particular author, that author alone would be read up. If he narrowed the reference to one volume of that author, then the volume only would be read, and so on to a very conceivable extent. Of greater importance was another objection, which had, he knew, led some men of eminence to look with disfavour upon that part of the examination which embraced drawing. They doubted the power of any examiner to assign proper and exact places of merit to designs, worked out in various styles, and feared that the students' work would be influenced by the known feelings of the examiner. These difficulties certainly did not present themselves in his (Professor Lewis's) experience, and he thought that he might say the same of others. But the examination had to him a prospective advantage beyond the mere learning. The published list of questions would show clearly to any intending student exactly the kind of

knowledge which would be of real use to him, and also the technical reason for its use, and, in after life, invite him to keep up some branches of knowledge which otherwise he might neglect. In conclusion, the Professor said, the case seemed to him to be this. A student before entering an office required a good ordinary education, but with a much greater knowledge of drawing and science than was usually obtained. But as to the technical training, which the architect required afterwards, Professor Lewis was more at a loss. In few instances did the pupil gain this in the ordinary routine of office work, and he must learn what he could from his fellow-pupils or assistants, or seek for it elsewhere. And beyond the office there was no definite place to be pointed out in which he could acquire it. The three years' course of engineering at King's and University Colleges supplied much of it, no doubt, but few young architects would afford time for this, and drawing, so important to them, occupied but a small place in the course, and, so far as at present existed, he must rely upon such applications of learning as such classes gave him; even were the means to be obtained, they could scarcely be of much avail, unless it were a recognised custom to allow the pupil more time to study than he had usually now. Offer what inducements one might, it would only be those young men who had greater energy than usual who would set to at hard work after their office work was done. But, if time were allowed, he thought that some such means as the lessons on the spot, by such a man as Mr. Sharpe, in art, and by others on construction, would go a good way towards supplying what was required. These might be of modest proportions, as compared with the grand academic education of the Continent, but after all it would be merely carrying out their work pretty much in a thoroughly English way, viz., that of submitting themselves loyally to some one teacher, a leader in whom they could put faith, and then, for working out the details, relying upon themselves.

Mr. Robins said that they must all have had an immense sympathy with the principles which Professor Lewis had just laid down. The system adopted in England of apprenticeships was very different from that abroad, which he thought should not be the case. He considered that there was a speciality in art as well as in other things, which was very important to them, and a specialty in the architectural profession he considered might be carried on with advantage to all of them.

Mr. E. J. Tarver stated that one of the earliest recollections he had, as a student, was that of a kindly smile and friendly nod which one always got from Professor Lewis. With regard to the subject before them, he would venture to make a suggestion as to the period of terms of their articles at one office, which, in his opinion, was too long,—three or five years in one office becoming rather monotonous to a student. He did not mean to say that the period of education should be shortened; on the contrary, it should be much longer; but he would recommend that a student should only remain in one office a single year, which was an uncommonly bad thing for the master, but the best thing for the student.

Mr. Phené Spiers agreed with Professor Lewis that it would be of great advantage to the profession if a large number of its members were educated at the universities. As to supplementing their course, University and King's Colleges had been referred to, and he thought that if it were possible to spend a year or two at either of these colleges, it would be of the greatest possible service to every architect. If this could not be done, the next best thing was to attend evening lectures, and he was in hopes, some time or other, that the Institute would establish a course on purely technical subjects. For the first two or three years, as a rule, students did not know what to do; but he would urge upon them the necessity and importance of learning to think for themselves. With regard to architectural examinations, there had not been that success in this respect which was hoped for. Since Professor Lewis first started the architectural examination, there had been many changes made in it in accordance with views expressed by this Association. At the recent examination, when there was not one stumbling-block in the way, for every possible facility had been given in the matter, only five students presented themselves. Did students now think that the examination was hopeless? It was perfectly useless for the Institute to continue examinations if such a small number again came forward. The main value of the examination was, that it gave an end and aim for all the study done at the Association. A committee of the Institute were again going to take up the question of their prizes, and he trusted that the students would, during that time think over the matter.

Mr. Ferrey considered that an immense benefit was gained by architects visiting works which were in progress, for such experience was invaluable, and could not be obtained by any amount of book-work. He did not agree with Mr. Tarver as to a pupil being only one year in an office, and thought that three years was not at all too long.

Mr. J. Douglass Mathews agreed with Professor Lewis that it would be to the advantage of the architect to be accompanied to brick-fields, timber-yards, &c., by some competent man, who could in a short time give him a full knowledge of any technicalities during such visits, which would be to the advantage of himself and his clients hereafter.

Mr. Watson said that it seemed to him much of their difficulty arose from the fact of having a very large syllabus before them, and not knowing what to do. He believed there was nothing more valuable to students making their first steps in the architectural profession than these examinations. The system of pupilage in architecture had worked extremely well; it had many defects, but what were they going to put in its place? In London there were extraordinary facilities for acquiring a professional education, and an examination was certainly necessary, for it was a test of education.

Mr. Quilter would not advocate specialities in architecture until the architects had received their qualifications. When this was done they could devote themselves to special branches of the profession.

Professor Lewis, in reply, said that what students clearly wanted was something more than a mere communion of fellowship between themselves; some one at the head who could teach them something that they did not know. With respect to visits to buildings, it really seemed to him this was the most practical way of giving practical education. If they went to a building, and the architect showed them round it, that was not sufficient; but they required a paid instructor to minutely explain everything in connexion with the building. The lectures afterwards were extremely necessary, and he assumed that they had known sufficient of the rudiments of science to thoroughly understand what they were told.

FOREIGN TIMBER.*

ABOUT a year ago Lord Derby addressed a circular to her Majesty's representatives abroad, requesting information as to foreign timber, including timber used for shipbuilding, house construction, and railway purposes; and answers have now been received from a considerable number of Consuls and Secretaries of Legation, and have been published in a Blue Book, portions of which we have already printed. Some of these reports are very meagre, and replies have not, apparently, come to hand from Russia, Italy, Turkey, or Spain; but, from those which have been printed, a very fair idea may be derived of the actual condition of the forests of Europe at the present time, and of the probable state of the timber supply for some years to come.

The first point which strikes the reader is the almost unanimous testimony which is given that the European forest area is rapidly diminishing. This is the case in Austro-Hungary, where the decrease is attributed to "The wanton and irrational destruction of the timber by the peasants." It is stated that in France about three-fifths of the woodlands owned by private persons (and most French forests are in private hands) produce only underwood and brushwood, and that, moreover, these woodlands are rapidly diminishing, "partly owing to the small value of the underwood, and partly owing to the frequent division of properties, which renders the planting of trees with the view of allowing them to grow into timber an unremunerative undertaking." Indeed, France has to import almost all the timber she requires for building, and there is generally a difference of from 130,000,000 to 140,000,000 between her exports and imports of wood. In Sweden, although it cannot be said that the forest area is diminishing, its productive power is becoming rapidly smaller, owing to the indiscriminate felling of miniature trees; and the same cause has led to a similar result in Norway. In Switzerland, also, it is found that wood is becoming scarcer, owing to the reckless waste attending its consumption. The same state of affairs is noticeable everywhere. As we recently showed, the forests of India have been greatly damaged by the mode of felling practised by unscrupulous contractors; and in the reports before us we find it stated that even the vast timber-producing lands of the United States are being quickly exhausted, on account of the waste of the article for fuel, and, in a less degree, "through running fires, the ravages of insects, obstructions in streams, and other causes." It is only in countries like Prussia and its German dependencies, where a semi-military mode prevails even in the civil administration, that the forests are found in a satisfactory condition. Thus, in Baden and Hesse-Darmstadt the forestal laws are almost as stringent as those of Japan, where the man who cuts down a tree must immediately plant another. The Hessian rule is, that every thirty years, land which has once belonged to the cultivation of trees must return to its original employment; and the police control the cutting down of wood even in private forests. The consequence is, that "the forests preserve their character for being some of the finest in Europe, and boast some of the finest and healthiest trees." In Wurtemberg, a plan of felling is drawn out annually, and the State revierförster marks the wood to be cut down, while private forests cannot be brought into cultivation without the express sanction of the forest police authorities; and the persons responsible for clearances are compelled to replant the ground within a stated time; while in cases of non-compliance the area is replanted at the expense of the owner by the police. By such means it is found that the desired end is attained; and while our Government is proposing to disafforest great tracts like the New Forest, the Governments of other countries are endeavouring to preserve their forestal wealth by regulations and enactments of increasing strictness. Austria has abolished feudal privileges, and repeated supplementary decrees for the protection of woodlands have lately been issued from the Ministry of Agriculture. In addition to these measures, attempts have been made to win the approbation of landowners and the goodwill of the people by the establishment of nursery-gardens and schools of arboriculture, whence teachers are disseminated throughout the empire, and by offering prizes both to those who have successfully replanted clear spaces, and to those who exhibit the best seedlings and young trees at exhibitions. In Sweden and Norway, laws have been passed prohibiting the felling of trees of smaller diameter than 7 in. at 16 ft. from the ground; and a considerable sum is annually voted to purchase private forest lands, so that they may be administered under the eye of the Government. The recently-revised constitution confers upon the federal authorities of Switzerland a right of supervision over the forests of the highlands; and, besides devoting considerable sums to re-wooding the unduly cleared portions of their territory, almost all the cantons have laws for the protection, renewal, and extension of the forests, while unremitting efforts are made to spread information concerning sylviculture among the masses. In Europe, at least, it is impossible to provide sufficient timber without such precautionary measures. They have been found necessary in India; and it is only too plain that even on the American continent the time is not very far distant when the ignorant rapacity of the settlers must be checked by law.

These reports naturally convey no novel information respecting the distribution and characteristics of the building and trades timbers of Europe. Their authors have invariably been indebted to standard works in which the same facts are better stated, and the bald lists of names before us are practically useless to builders and others who want to know where to find abundance of suitable wood within easy reach of the scene of their operations. We are only reminded of the fact, known long ago, that the chief timber-producing trees of Europe are pines, oaks, beeches, maples, larches, birches, elms, alders, poplars, limes, and a few others, which are equally familiar. The reports from the American continent are more interesting. In the report from the United States a long list is given, containing the names of 285 trees, of which no less than thirty-five are diversities of oak, while other European varieties abound in

* Reports respecting the Production and Consumption of Timber in Foreign Countries.

similar profusion. Mention is made of an abundance of walnuts and magnolias, of iron-wood and of mahogany, satinwood, and lignum vitæ in addition; but their names are merely recorded, and not a word is said about their properties. From Brazil, however, we have a report of a different character. More than twenty trees are noted, and some curious particulars are given about each of them. The information, however, is less practical than peculiar. We are told that the jacaranda is the favourite timber-tree, that South American pines are found near the settlements, and that the Arueira (*Schinus terebinthofolus*) is of excessive hardness, resists the weather admirably, and takes a fine polish. Beyond this the foreign contractor will not be indebted to her Majesty's representative; although those who take an interest in the romance and folk-lore of the woods will be interested to learn such facts as that the natives will not burn the *Cedrela odorata*, because they believe that it supplied the wood for the true cross; that they will not sleep under the arueira, beliving it to produce tumours on the face; and that they catch fish by intoxicating them with the bark of the Tinqui, which they throw into ponds and streamlets. The Cuban report is full and good. Ninety trees are named, and a brief description is supplied of their properties and common uses. Among others we find the Acana (*Bassia albescens*), a very hard, compact, and inelastic wood which breaks vertically. A piece a yard long and an inch square resisted a strain of 408 lb., bending on an arc of 1·9 in. It makes excellent posts for buildings, and is used also for window frames. Next in alphabetical order we have the Almendro (*Laplacea curtyana*), which is hard, compact, and flexible. It is used for beams. A piece of the same dimensions as that just given formed an arc of 2·9 in. under a weight 547 lb., and did not break entirely under that pressure. Then comes the cedar (*Cedrela odorata*), which is described as "very useful for all carpenter's work, buildings, and cabinet-making," on account of its freedom from the attacks of insects and its softness. The test sample broke in an arc of 2 in., under 300 lb. weight. Ebony follows with a resistance of 305 lb., at an arc of 1 in. Further on we meet the Jaragua (*Philanthus myrtiloides*), hard, compact, and somewhat elastic, which is said to be "everlasting in posts." A specimen of it broke at 583 lb. strain in an arc of 2¼ in. The Jocuma (*Sideroxylon mastichodendron*) is a hard wood used for building and all kinds of carpenter's work, while the Majaqua is in so great demand that it is getting scarce. It grows very quickly, however, and if the island were at peace would be replanted. The last we shall name is the Yaba (*Andira inermis*), a hard, brown wood, stated to be indestructible under water and under ground. It resists 300 lb., and bends 3 in. But these are only a few of the best woods, and almost all of the ninety named may be made serviceable in the arts of construction and decoration. A report of similar excellence comes from Honduras, but it contains the names of only thirty-three different woods. Mahogany naturally occupies the first place, and we find also the familiar cedar, pine, iron-wood, oak, and fustic. Among those less known we have San Juan, a tall tree, growing to above 2 ft. in diameter, and extensively used for building purposes; Sisileon, a large tree with a red durable wood, highly esteemed by carpenters; and Santa Maria, a tall tree, resembling mahogany, of whose character it partakes. It is one of the best woods known for wet works such as piles and foundations, contains no acid, resists great pressure, and is found at a short distance from the coast. With regard to Honduras it is stated that notwithstanding the considerable export of its woods the loss is scarcely observable, and that beneficent nature very speedily repairs the destruction effected by the axe.

Secretaries of Embassy and Legation are in a position to obtain reliable information and statistics which are not within the reach of ordinary inquirers, and these reports contain many interesting facts which would not have been made public had not Lord Derby asked for answers to his questions. But many of the Governments which were applied to were themselves unable to reply to the queries propounded, so that the reports are much less complete than could have been desired. Running down them in the order in which they stand, we find that Mr. French can tell us comparatively little about Austro-Hungary. He sets down the timber-producing area of the empire at 19,000,000 of English acres, and estimates the total exports of wood at 67,400,000 florins decennially. Home consumption absorbs the most considerable portion of the produce of the forests. Brazil is so wealthy in timber that the Government scarcely troubles itself about it; but the Customs returns show an average export equal to about 120,000*l.* in value, and the quantity exported is on the increase. Thirty-eight trees are named for building purposes which are said to endure from twenty to forty years, and some of them have even been said to last from sixty to eighty years. Ten are marked as particularly fit for railway sleepers. French official returns show that, in 1873, England was indebted to the sister country for 2,616 cubic mètres of building oak and 169,216 cubic mètres of other building wood, but, as already stated, France has little to give away, and imports much more than she sends out. Information respecting Baden, Hesse, Saxony, and Prussia proper is scanty, as the Zollverein has the management of all statistics respecting imported and exported goods in Germany. According to a recent calculation, it would appear that the forests in Hesse are grown upon an area equal to 594,975 English acres. This statement, which is founded on official data, is rather startling when it is remembered that the whole area of the Grand Duchy does not exceed 139½ square miles, or 757,120 acres; inasmuch as it only leaves 162,145 acres for agrarian purposes. Twenty-three per cent. of the whole area of Prussia is forest-land, and the timber area of Saxony covers about 1,162,000 acres. Mr. Dering's report from Sweden and Norway is very full. The last general measurement gave an area covered with forest in Sweden of about thirty million acres, being 42·8 per cent. of the whole surface of the country, and this is exclusive of Lapland, which has never been surveyed. Taking the average of estimates given by the best available authorities, the annual consumption of forest produce may be computed at 7,950,133 Swedish cords. In other words, the product of about 30,000 acres is annually consumed, the period of re-growth being 100 years. In 1872, Sweden exported about 4,779,137*l.* worth of timber and fashioned wood, and of this quantity Great Britain took 2,363,652*l.* worth, or nearly one-half of the whole export of the country. There is hardly a maritime country in the world, with the exception of China and Japan, to which the produce of Swedish forests does not appear to find its way. The forest lands of Norway cover about 35,000 square miles. Britain again takes about half the produce. The forests of Switzerland cover an area of about 1,900,000 acres, or about 18·8 per cent. of the entire surface of the country. The annual export for building purposes, fire-wood, and charcoal is about 10,900,000 cubic feet; but this export is steadily decreasing. During 1873, the United States exported timber and wooden manufactures to this country valued at 532,068*l.*, and to British possessions similar goods to the value of 241,439*l.*, or a total export to Great Britain and her colonies of wood worth 773,507*l.* From Mr. Petre's report we learn that 30·6 per cent. of the area of Wurtemberg is covered with forests. A considerable quantity of oak is exported to Holland for ship-building purposes, and the Dutch also use Wurtemburg oak for the erection of mills. Manheim is the great outlet of the South German timber trade. The Cuban report says:—"Were the fellings properly regulated and judiciously superintended, the export of timber, useful abroad, from Cuba might still be very large, even although the Government did not insist on replantings. 3,000,000 square feet of mahogany, 5,000,000 square feet of cedar, and 2,000 tons of fustic wood would be ready for the axe every year." No calculation of any value can, however, be made at present, as most of the best forest land has, for the last six years, been in the hands of the insurgents. It is unfortunate that these reports should not, as a rule, attain the standard of excellence usually observable in commercial reports, and that the information they convey should be so limited, owing to the absence of reliable statistics. It is, however, to be hoped that those still to come will be more explicit, and that the questions put by the Earl of Derby will not be forgotten at our embassies and legations, but that future attempts will be made to supply the gaps which are now unavoidable.

Proposed New Baptist College. — The Baptists in Wales, who have already three training colleges for ministers, propose building another at Cardiff at a cost of 12,000*l.*

THE LATE MR. JOSEPH JAMES, ARCHITECT.

THE death of Mr. Joseph James, at a comparatively early age, has been announced. He was a son of the late Rev. Thomas James, of Highbury. Thomas James had three sons, and Joseph was the last to die, one brother having died only a few months previously. Joseph James was articled to Mr. Daukes, and became a student of the Royal Academy. For some time he was assistant to Mr. Horace Jones, then in Furnival's-inn, and afterwards was in practice for himself for many years in Furnival's-inn, and afterwards in Finsbury-circus. One of his earliest and most important buildings was Spring Hill College, Birmingham; the next, Square Church, Halifax, illustrated in a former volume of the *Builder*; and he built many other churches, chapels, and schools all over the country; and the West of England Dissenters' College, also illustrated in our pages. A year or two ago, Mr. James was appointed one of the School Board architects, and built the large schools in Riley-street, Bermondsey (his last work), and which was illustrated in the *Builder* last year. Mr. James had complained that excessive hard work had knocked him up; for the last eighteen months he had done nothing, being thoroughly ill. Only a week or two before he died he hopefully returned to Highbury, to live near his late father's old house, where all his early years were passed, and it was at Highbury he died.

Joseph James was one of the most amiable and gentle of men, an excellent and accurate draughtsman, and no mean colourist; his knowledge of the details of architecture was considerable; the style he generally selected for his buildings was Early English, of a late type, but he was well acquainted with Classic architecture.

Some eight years since he married Miss Blackett, sister of the late Mr. Blackett, of the firm of Hurst & Blackett (and sister of Walter Blackett, architect), and has left several children.

FARRINGDON-ROAD GOODS STATION.

THE unobservant passenger in Farringdon-road may have been unconscious of there having been in full operation for many months past, in connexion with the Great Northern Railway, a large goods station. He has been unconscious of its existence and activity simply because the large covered area is all under the street level, and inclosed by boundary walls too high to afford a sight of the rails or goods yard below. Of late, however, a lofty and rather ornate superstructure has been rapidly rising on the site of the original station at the junction of Farringdon-road with Charles-street of the Metropolitan Railway Company that no passenger can fail to notice.

The covered space of the substructure already in full work is very large, and in shape irregular. The elevation to Charles-street will have a length of 42 ft. for the block of offices, and of 92 ft. adjoining, in the end frontage of the goods warehouse. The side elevation of the warehouse pile facing Farringdon-road will be, when finished, 310 ft. long, but only half of that length is being put up at present; the other half, now roofed at the ground level, will have the roof taken off, the walls raised, and the work finished uniformly with the building now in progress. The warehouse will then be a block of building 310 ft. long, 92 ft. wide at one end, and 42 ft. at the other; bounded on one side by the Metropolitan Station and Railway, and on the other by Farringdon-road; at the broad end bounded by Charles-street, the narrow end running into the Great Northern Company's lines. The present covered area for the accommodation of goods traffic embraces in all about 3,544 square yards, which is, of course, exclusive of the space covered by the office buildings. Three lines of rails run into the covered space, which is furnished with the necessary platforms, and hydraulic capstans, worked by a treadle, with catch-heads, giving the means of moving loaded or empty wagons from any part of the station without using horse-power. There are also thirteen hydraulic cranes in different parts of the station, with powers to lift from various weights of from 1½ ton to 4 tons. A 20-ton hydraulic hoist will be provided to raise and lower loaded trucks between the rails and the Farringdon-road or ground level, and four 3-ton hoists communicating between the ground and the upper floors.

The ironwork, of which there will be upwards

of 1,500 tons in sub- and superstructures, is somewhat peculiar in character. In numerous instances, where clear space on the ground-floor is a desideratum, very strong wrought-iron stanchions, with an inner web for extra strength, take the place of cast-iron columns. At the upper angles they have brackets, giving the girders an extra bearing of about 3 ft. on each side. The stanchions are 2 ft. by 1 ft. 5 in., and built of four 2½-in. plates, strengthened by angle irons 3½ in. by 3½ in. by ⅜ in. The rivets of the stanchions and girders are ¾ in., with 6 in. pitch. A number of the stanchions have been tested up to 700 tons each. Six of the box-girders weigh 10 tons each.

The roofs, which will be placed across the building, will be of iron, and supported on lattice girders. The rafters of T-iron are to be 3½ in. by 3 in. by ½ in.; the struts, 2½ in. by 3 in. by ½ in.; and the tie-rods ¾ in. Each cross-roof will have a wide louvred light at the ridge; the remainder will be covered with Bangor countess slates.

The fire-proof floors of the structure will be a special feature. They will be constructed on the system patented by J. Westwood, jun., of London-yard Ironworks, Poplar. The flooring is of corrugated iron plates, levelled up with concrete, and faced and finished with Val de Travers or other rock asphalte. The essential feature is the method adopted of supporting the floor, by comparatively light trusses in the place of heavy iron girders. This system of flooring has already been introduced in other buildings, and it is claimed for it that it is extremely rigid, light, and durable; that it is applicable to every class of building, and combines a maximum bearing power with a minimum weight of flooring and support. The results of a test applied to this flooring are reported to us as follows:—the flooring tested had a clear space of 35 ft., divided into five bays of 7 ft. each. The depth of truss at the centre was 3 ft. A load of 48 tons was equally distributed over a space of 6 ft. in width, which multiplied by the span of 35 ft. super., or 210 ft. in all, gives 4½ cwt. per foot super. as the load borne. The deflection under this crucial test was ¾ in., and the permanent set, after removal of the load, ¼ in. The total weight of flooring, trussing, concrete, and asphalte, was less than 41 lb. per foot super., showing a large saving in weight of material, load taken into account, as compared with other systems. The Hoarwithy Bridge, in Herefordshire, 250 ft. long, has been built upon this system at a saving, it is stated, of 30 per cent. The front elevations of the offices and warehouse show a ground-floor, and first and second floors above the street level. They promise to be very effective, quietly harmonious, and free from the patchy appearance that a lavish use of parti-coloured bricks is so apt to impart. The principal material in the fronts is wire-cut Burham brick of Gault clay. The surfaces will be relieved and enriched by a liberal use, in string-courses, mouldings, friezes, caps, cornice, &c., of Pether's patent moulded bricks, made of the same clay, and having, of course, precisely the same colour. The dressings of Portland stone harmonise with the brick-work in tint. The only exception in the way of introducing colour is in a course of Pether's patent plain radial red bricks, with a course of blue bricks over it, above the windows. An egg-and-dart string course, and an ogee and cavetto moulding, carried round the two fronts, are very effective, as the ornamental patterns in the cornice, and other unostentatious enrichments, promise to be also. The elevations are divided into bays, within which the windows are coupled. There will be four entrances for carts and wagons from the street level. The foundations of the piers upon which the superstructure rest are on beds of concrete 2 ft. thick, resting on the London clay, reached, in some places, at a depth of about 14 ft. below the rail-level. The piers are of blue brick, in one to one cement, and are about 8 ft. square; one of them that has extra duty, is 11 ft. 6 in. by 8 ft. The walls are 2 ft. 6 in. thick at the bottom, diminishing upwards to 1 ft. 11 in. under the roof girders, and 1 ft. 6 in. above. There are four strands of tarred and sanded iron hoop in the lower parts of the wall, and three and two strands above. There will be 13,089 yards of hoop in the completed building. The windows are Moline's patent wrought-iron sashes, filled with 26 oz. glass. The roof-lights will contain 2,375 ft. super. of $\frac{1}{16}$ in. rough plate-glass. In the office windows there will be 656 ft. super. of British plate-glass. The iron windows have opening spaces in the centre, that may be kept open at any angle. The stairs will have Hawksley's patent treads, supplied by Messrs. Westwood, jun.

The buildings, and all details, are from the designs of Mr. R. Johnson, C.E., Engineer in Chief of the Great Northern Railway Company; Mr. W. Wilkinson is resident engineer; and Mr. J. N. Thompson, clerk of the works, to all of whom we are indebted for access to the drawings, and their polite supply of any desired information. Messrs. Eastwood, Swingler, & Co., of Derby, are contractors for the iron work, and Mr. Randall, of Woolwich, for all the other branches.

THE MADRAS RAILWAY COMPANY.

THE annual general meeting of this company was held on Tuesday last to receive the report of the directors. The reports to this company appear usually to consist of excuses for the non-fulfilment of anticipations and explanations of disasters. This time it is singularly jubilant, because the great amount of injury done to various parts of the railway by floods has not affected the traffic receipts even more injuriously than is the case. The directors seem delighted that such an opportunity for the display of energy should have been afforded to the company's officers. The following are the more important bridges which received serious injuries:—

"At the Goriattum Bridge, on the South-West Line, five arches were swept away. At the Cheyair Bridge five piers and two abutments. At the Paupugnee Bridge four permanent and two temporary piers were washed away. At the Chittravutty Bridge nine piers were destroyed and two sets of 140 ft. girders carried away, besides two more much damaged. At the Pennair Bridge two piers were destroyed. Besides the foregoing, innumerable other casualties of a minor description were experienced on several parts of the lines."

"In regard to the reconstruction of the damaged portions of the bridges, in order to render them capable of passing trains when the rivers shall again be in flood, the acting chief engineer, in a letter dated 5th March, remarks that 'designs for these works have been duly submitted, and have received the sanction of Government. They are being executed with the greatest possible energy. How far we shall succeed in completing them without interruption from floods is a matter of some little uncertainty, depending upon the character of the season as regards rainfall.'"

The most amusing observation in the report,—amusing, that is, to those not pecuniarily interested,—is the following:—"When the repairs here referred to are completed, it is expected that the bridges will be as secure as they have ever been." Does the consulting engineer, Sir John Hawkshaw, take the responsibility of these works?

The company may be able perhaps to lessen the cost of their staff. If they wish it, we will send them out half a dozen lively young engineers who will design and superintend for them, with wonderful self-confidence, any number of bridges capable of being washed away by the next freshes.

FURTHER NEW PIERS AND HARBOUR WORKS AUTHORISED BY PARLIAMENT.

PROVISIONAL Orders have been made by the Board of Trade authorising the erection of the following piers and other works in addition to those referred to by us in a previous issue; and the Bill confirming these Provisional Orders by Parliament has been so far agreed to as to have received the sanction of the House of Commons, and to have passed a second reading in the Lords. The following are the principal works authorised:—

At Carrickfergus, two new piers are to be constructed, one commencing at the southern end of the quay known as Wilson's Quay, and extending in a south-easterly direction along Wilson's-road for a distance of 570 ft., thence in a south-south-easterly direction for a distance of 620 ft. to a point near the Red Buoy, and thence continued for a further distance of 190 ft. in an easterly direction, and terminating with a curved pier-head; the total length of this pier, to be known as the West Pier, will therefore be 1,380 ft. The second pier, called the East Pier, will commence at the south end of the existing pier at Carrickfergus, and extend in a south-south-westerly direction for a distance of 590 ft., terminating with a curved pier-head. Powers are given to the Commissioners appointed to carry out these works to dredge and excavate the shore and bed of the sea, and to divert the Killycost stream and construct such sea-walls, roads, and other works as may be necessary to render access to the piers complete and convenient. This scheme will immensely increase the facilities for the embarkation and landing of passengers and merchandise at the harbour. If the works are not substantially commenced within two years from the passing of the Act, or if they are suspended for twelve calendar months consecutively, the powers of the Act are to lapse.

The harbour of Macduff, in the county of Banff, is to be improved by the construction of the following works:—

A pier or breakwater connecting the existing east and north piers, commencing 57 yards from the end of the former, and ending at the extremity of the latter.

An opening in the existing east pier, commencing at a point 124 yards from the end of the pier, and about 12 yards wide, in order to afford a communication between the existing east harbour and the harbour or basin to be formed by the construction of the intended pier or breakwater above described.

An inner jetty commencing from the east quay of the east harbour, and extending 32 yards into the harbour.

An inner jetty commencing at the south side of the east pier, 109 yards from its extremity, and extending 3 yards into the harbour.

A circular harbour and basin will then be formed, which is to be excavated and deepened as far as required.

Any such bridges, gates, wharfs, roads, tramways, &c., as may be required for the maintenance and improvement of the harbour are also authorised, and the quays, piers, and jetties can be "altered and improved" from time to time.

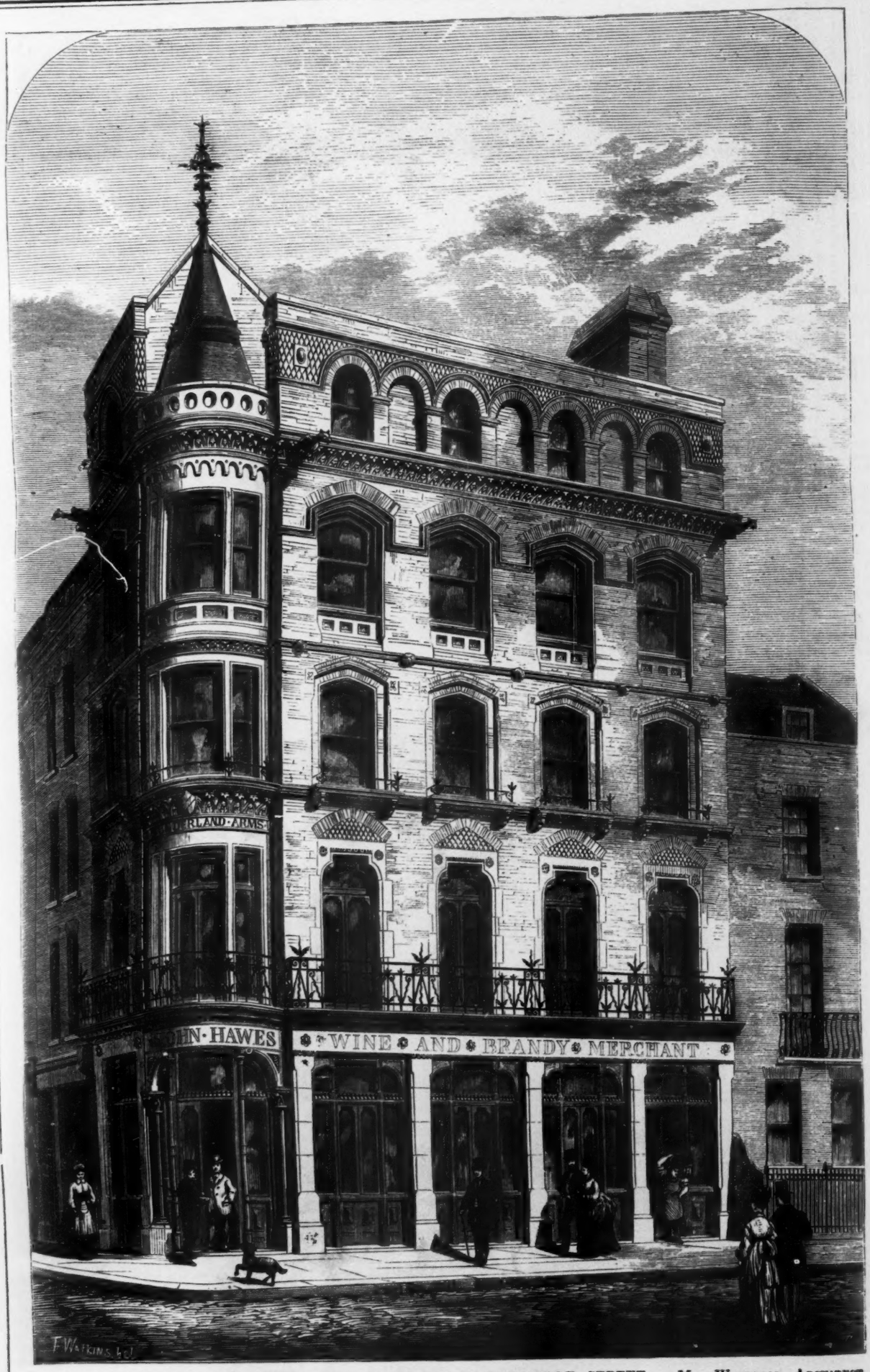
The same limit of time for the commencement of the work is stipulated for as in the case of Carrickfergus.

Rosehearty Harbour, near Fraserburgh, Scotland, is to be improved by the extension of the Port Rae pier to a point 67 yards south of the beacon near Damar Rock; by the extension of the east pier of the harbour from a point 40 yards from its extremity to the Port Rae pier; and by the construction of a quay-wall along the shore between the two piers. The harbour and its approaches are to be deepened and extended.

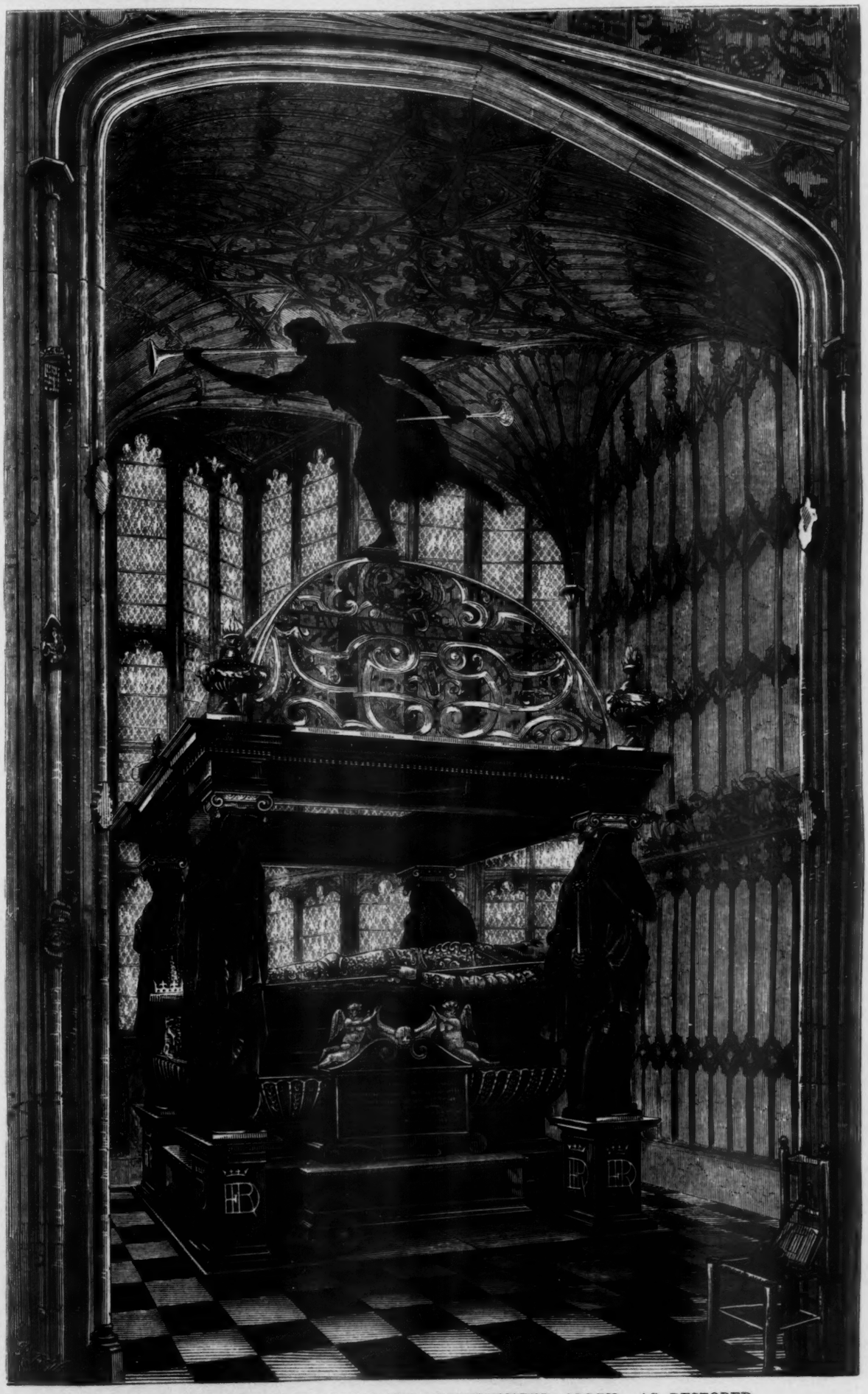
THE "SUNDERLAND ARMS," SACKVILLE STREET, PICCADILLY.

THIS house has just been rebuilt from the designs, and under the superintendence, of Mr. J. T. Wimperis, of Sackville-street. The old house was erected just 101 years ago, and was of the very poorest description and not worth repairing. An extension of lease was procured from the Sutton Estate office, who are the ground landlords, and the tenant, Mr. Hawes, at once made up his mind to pull down and rebuild instead of attempting to patch up the old building. The great difficulty was the narrow piece of ground with which the architect had to deal (being only about 17 ft.), and the accommodation required on so small a space; the difficulties, however, have been mainly overcome, and an important frontage has been made in Sackville-street, which gives the house the appearance of considerable size, though it only contains about two rooms and staircase, with conveniences, on each floor. The materials used for the fronts are white Suffolk bricks and Portland stone, and the framings forming the shop-front are entirely of wainscot, polished, with embossed plate glass in doors and windows, and polished red granite pilasters, with blue granite columns by the side of the principal entrance, and red Mansfield stone frieze.

The builder was Mr. Chas. Fish, of Pimlico; the ornamental ironwork is by Hart, Son, & Peard, of Wych-street; the stone carving by Anstey, of St. John's-wood; and the granite work by Messrs. Macdonald, Field, & Co., of Aberdeen. The interior fittings on the ground-floor are in mixed woods, mahogany, pitch pine, and wainscot, with parts ebonised and gilded, the whole polished, and are designed to harmonise with the exterior of the building. Business has been carried on during the whole of the rebuilding, which has of necessity hindered to some extent its progress. It is proposed to put up the name on the stone fascia with bronze letters, and so avoid all glass fascias and the usual accompaniments of houses in this line of business; the idea throughout being to keep the building as quiet and unobtrusive as possible, and to make it a pleasing addition to the architecture of the street, in which the architect has certainly succeeded.



TAVERN ARCHITECTURE: THE SUNDERLAND ARMS, SACKVILLE STREET.—MR. WIMPERIS, ARCHITECT.



TOMB OF THE DUKE OF RICHMOND, WESTMINSTER ABBEY: AS RESTORED.

RESTORATION OF THE TOMB OF THE DUKE OF RICHMOND IN WESTMINSTER ABBEY.

THE tomb of Ludovic Stuart, Duke of Richmond, and of his wife, Frances, daughter of Lord Howard of Bindon, of which we give a view, has just undergone much necessary repair and considerable restoration. This eminent nobleman lived in the reigns of Elizabeth and James I., being a second cousin of the latter. He succeeded his father, Esme Stuart, as second Duke of Lennox, and obtaining the favour of James, then king of Scotland, he was made High Chamberlain and Admiral of Scotland. When James succeeded to the English throne the Duke b. came Master of the Household, First Gentleman of the Chamber, Ambassador to France, and Knight of the Garter, and upon him were bestowed successively the titles of Earl of Richmond, Earl of Newcastle, and Duke of Richmond. Dying in 1623 without issue, the Scottish titles fell to his brother Esme, and the English titles became extinct, although they were afterwards revived in the same family. The last who bore them died in 1672, when the titles and estates reverted to the Crown. Both, however, were soon afterwards bestowed by King Charles II. on Charles Lennox, one of his natural sons by Louise de Queronaille, Duchess of Portsmouth.

The costly erection in Westminster Abbey was made by the widow of Ludovic Stuart. It appears to have been in good preservation in 1723, for Crull and Dart, the historians of the Abbey, describe it as "stately and sumptuous." Dart gives a fine plate of it in his first folio volume. He omits, however, to show the metal ornamentation of the frieze, and also the sword and wand, which evidently once belonged to the monument, though they had probably then disappeared.

The monument may have even then shown signs of the decay going on because of the original faultiness of the construction, but since that time some of the principal parts had become seriously dilapidated. In consequence of the use of iron cramps and bars, many parts of the black marble were burst into fragments; the whole of the table on which the effigies rest, was lifted a full inch, and a corresponding quantity of iron corrosion was found within. [The destructive and dangerous effects of this corrosion are now manifest in many monuments, more particularly in those of Queen Elizabeth and Queen Mary in Henry VII.'s Chapel, and those of Kane and Coote in the North Transept.] Still more damage had been done to the Duke of Richmond's monument by the wilful spoliation of the bronze metal work, which must have taken place chiefly since 1723. An examination of the monument, with the help of Dart's valuable plate, led to the discovery of there being 230 pieces of metal work missing.

Upon a suggestion made by Dean Stanley, the Earl of Darnley, a descendant of the Stuart Dukes of Richmond, has had the monument restored by Messrs. Henry Poole & Sons, of Westminster. The details given by Dart have been faithfully adhered to, except in the addition of the sword and wand, and the George and coat of arms at the head. Concerning these there is no direct information in Dart; but the sword and wand are warranted by contemporaneous authority, and the coat of arms, with the shield surrounded by the garter, the ducal coronet, and two wolf supporters, have received the sanction of the Royal College of Arms.

The bronze effigies of the Duke and Duchess (his right hand holding her left) rest upon a massive moulded table of marble. The robes and tasselled cushions are elaborately wrought with embroidery and fur work, the duke's armour being diapered. Supporting the table is a very large fluted and reeded sarcophagus, of black marble, with a richly-moulded pedestal. The flutes are filled with husk-work in gold. At the sides are golden figures of winged boys, upholding drapery, and exposing two skulls. At the ends are two coats of arms, one at the foot (as plainly shown in Dart) with the lion and the ox as supporters, the other at the head (as already described). At the feet of the duke is a gilded crest of the cumbent lion seated on a chapeau, bearing a ducal coronet, and tongued with flame. At the corners, on pedestals of black marble, are the life-size effigies of Hope, Charity, Truth, and Prudence, as caryatides. These are of plain bronze. They stand on gold bases, and on their heads are golden cushions and gold Ionic capitals. Upon these rests a richly-moulded entablature of black marble. The latter has lost several rich ornaments of gold. At the angles of the corners are four large urns, ornamented with festoons. From the top of the entablature the space beneath is spanned with a square vault of plated gold, embellished with crests, mottoes, monograms, foliage, and scroll-work. The mottoes are, "Avant Darnley," "Distantia jungo," "Quod vide vis esto," "Constantia coronat." On the summit of the dome is a flying figure of Fame, in bronze, holding two golden trumpets, and its toe just touching the pedestal.

One curious feature deserves notice. In the inscription the date of the year of the Duke's death is apparently omitted, though the month and day are mentioned. The year, however, is given in what is called a chronogram. The Latin translation of the verse in the Bible, "Know ye not that a Prince and a great man has this day fallen" (the words uttered by David in his lament over Abner), contains fourteen Roman numeral letters, and these being elongated into capitals are MDCVVVIIIIIIIL, which give the date 1623. It is remarkable that words so appropriate to this nobleman should contain the numerals for this identical year, and it shows much ingenuity on the part of the writer of the inscription that he should have discovered it.

This richly-wrought tomb with its jet black highly polished marble and beautiful goldsmith's work, must have been very magnificent when new, and notwithstanding the wear and decay it is still remarkably handsome. The artistic workmanship was the best of its kind then, and even now could hardly be surpassed.

The northern side of the enclosure is a dwarf wall, being the ruined basement of an open screen, 15 ft. high, long since destroyed. On its inner side is what is called a "mourner's seat," by stepping on to which one may see the faces of the effigies.

Those who care to realise the improvement effected by this restoration, may do so by observing the degraded state of the almost contemporaneous monument of George Villiers, Duke of Buckingham, on the opposite side of Henry VII.'s Chapel. This monument has been of even greater splendour than that of Ludovic Stuart. The tarnished and corroded surface of its metal work entirely conceals the goldsmith's work, while the black marble is chipped, dislocated, and corroded. This neglect, mutilation, and the spoliation of nearly 250 metal ornaments, fairly represent the recent state of the Richmond monument.

The engraving represents the view of the tomb looking south-west, showing also the beautiful "fan tracery vaulting" of the chapel. The low screen wall mentioned previously has been purposely omitted by the artist in order to give an uninterrupted view of the tomb.

DR. HERZEN'S PROCESS FOR THE PRESERVATION OF MEAT.

A CORRESPONDENT from Florence writes,—I can justify all you have said as to Dr. Herzen's process. It seems to me a wonderful discovery. Patents have been taken out in all the countries of Europe: so the ingredient is no secret, but is so simple and innocuous one wonders it has not been found out before. The meat can be preserved in quarters of carcasses: it is put into wooden barrels just after the animals have been killed, and the preparation put in. The boon it would be to our navy is inconceivable. It would also be a solution of the question, now agitating on the subject of the transit of the poor animals. They could be killed and transported with saving of expense and cruelty. When the Prince of Prussia was here, Dr. Herzen took a specimen of the meat to him, and he was so struck with the advantages that might accrue to the country, that he promised to call the attention of the Government on his return. The Italian navy and army authorities have given orders for certain quantities. One of the advantages over other inventions is this: a barrel of meat thus preserved can be opened, part removed, and the rest covered up and left till wanted, without the meat suffering. It is *not closed hermetically*. I have no *interest* in it, but know intimately most of those who have put down their money to test the affair, and set it going. Without some trick is played with the patent, I have no doubt of the success of the affair.

One of the shareholders has gone out to La Plata, and his letter, which arrived a fortnight since, is full of the brightest accounts. Oxen can be purchased there so cheaply that the hides and hoofs cover the cost of the meat; therefore, if to be had in sufficient abundance, the meat could be sold at the cost of transport. In a few days will arrive the first cargo from La Plata, when we shall see for how much it can be sold per pound. The first, I think, will be landed in France. The barrels contain a quarter of a beast each. Signor Conti gave a dinner to a number of naval officers at Buenos Ayres, of meat, poultry, &c., he had brought from Europe, all found to be *quite* fresh and excellent. I cannot help thinking of the benefit to so many in getting cheap meat, enabling our soldiers and sailors to eat fresh instead of salted meat, and above all, the saving of so much cruelty to animals. *We* do not expect the English to take up this invention for a long time, because they are prejudiced; but they must do so ultimately, I feel sure.

ON THE STRENGTH OF THE MATERIALS OF CONSTRUCTION.*

ARCHITECTURAL ASSOCIATION OF IRELAND.

AMONGST architects there are many and contrary opinions as to the benefits to be derived from studying the theory of the strength of materials employed in construction. Yet it must be admitted that the subject is intimately connected with architecture, for the highest order of artistic taste in designing beautiful structures is correlative with the utmost skill in arranging their materials according to their properties. We know that much saving of material might be effected if the limiting dimensions (consistent with safety) of the various members of the structure could be accurately determined, and much weakness of parts might also be avoided.

It will again be apparent that an architect possessing a knowledge of materials is less hampered with such difficulties as economising area or height when confined spaces are to be dealt with, or in reducing the cost of structures when the outlay is limited and materials scarce or expensive.

The science is, however, wide and difficult to master, and it is not hard to understand that a student, to whom other subjects of the profession are more attractive, would be likely to find the study of this one tedious and uninteresting. He ought not, however, be deterred by such prejudice, but should make himself thoroughly acquainted with the science; so as to be able to apply its principles readily and accurately in his every-day practice.

In the following paper I propose to give you only a few well-established facts connected with the strength of some of the materials used in ordinary construction, and to mention a few examples of their applications in practice. The strength of a material is the resistance it offers to fracture, in whatever manner that fracture may be brought about. The theory of this strength or resistance involves that of molecular mechanics, from which it borrows. "The principles on which are based rules of construction simple enough to be of general application, and yet sufficiently exact to be used with confidence."† It will, however, be convenient to divide the subject into two parts: first, with relation to the *inherent strength* of materials; and, secondly, with relation to what may be termed their *constructive strength*.

1. The *inherent strength* of a material is the amount of the resistance which its component particles offer to the disturbance of their equilibriam by direct force.

2. The constructive strength of a material is the amount of effective resistance it exerts when employed to transmit or oppose force in a structure.

We learn the theory of the inherent strength of materials chiefly by experiment, and their constructive strength partly by experiment and partly by combining the results of experiment with the theory of mechanics; and under the head of constructive strength three other matters must be considered, viz., the expansion and contraction of materials, the margin of strength which should be allowed in structures, and the durability of materials.

INHERENT STRENGTH.

You will observe in the definition I have given of inherent strength that the resistance of

* The following paper, by the hon. secretary, Mr. H. C. Brett, C.E., "On the Strength of Materials," was read at the general meeting of this Association, held May 27th, the president (Mr. W. M. Mitchell) in the chair.

† J. Gaudard, Min. Proc. Inst. C.E. Vol. xxviii.

materials is dependent on their texture or molecular constitution, and also upon the nature of the direct force to which they are subjected. The different molecular conditions that materials may assume are reducible to the following classes:—

1. *Fibrous materials* in which "the texture is uniform in all directions perpendicular to the fibres, but is quite different to the direction of their length." (Gaudard.) Wood, ropes, and wrought iron are examples of materials which come under this head.

2. *Amorphous materials*, in which the texture is assumed to be practically homogeneous, as in stones, bricks, &c.

Properly speaking, there should be a third class, embracing crystalline bodies; "but their molecular condition is too complicated to enter into the formula of strength, and such substances should be treated as amorphous, attributing to them co-efficients of a mean practical value." (Gaudard.)

We have now to consider the forces to which materials may be subjected. These, I have said, tend to alter the equilibrium of the component particles of the bodies on which they act, and are usually termed strains. Now, to determine a force, three things must be known: its direction, magnitude, and place of application; and these, it is needless to say, may vary without limit. The magnitude of a force is usually expressed by stating in numbers its ratio to a certain unit or standard of force, which is generally the weight of a known mass under particular conditions. In this country the pound avoirdupois is the unit; but in the investigation of the strength of materials the results are so large that it will be more convenient to express force in tons. In considering the place of application, a force is represented as distributed over a small area, such as a square foot or a square inch. The direction of force may be divided into two classes:—1. Those tending to bring the particles closer together by crushing. 2. Those tending to completely separate the particles by tearing them asunder. But for greater convenience these classes have been subdivided as follows:—

1. *Tensile strains*, tending to tear asunder the particles or fibres of the body, as in the case of tie-beams, tie-rods, &c. The tensile strength of a material is usually assumed to be in direct proportion to the area of the cross section, the stress being supposed to be applied uniformly on all points of the section and its resultant to pass through the centre of gravity.

2. *Compressive strains*, tending to crush the particles or fibres, as in the case of columns, struts, shores, &c. The first point to be noted is that the resistance of a material subjected to strains of this nature is not always proportional to its sectional area. For example, long columns, in which the simple compressive strain is complicated by a tendency to flexure, which, when the ratio of the height of the diameter is very great, may be the ultimate cause of failure. On the contrary, a very short column, of a ductile metal, will bear a very great weight, while the resistance of a flat disc is simply enormous. The effect, then, of compressive strains may be either to destroy by crushing, or by flexure, or by a combination of both these actions. Pillars which, under compressive loads, would fail by crushing only, are termed short columns, and it has been found that the weight necessary to crush short columns of any given material is proportional to the sectional area, and that it does not vary much provided the height of the column is not less than 1½ diameter nor more than 5 diameters; and by *crushing* strength of a material is meant the weight sufficient to crush a short column of that material whose base is 1 square inch. Those columns which, under compression, fail by the combined action of flexure and crushing are termed *medium columns*, and those which would fail by flexure alone are termed *long columns*. The laws relating to the strength of medium and long columns of the various materials I shall consider under the head of constructive strength.

3. *Transverse strength.*—Tendency to produce rupture in a direction perpendicular to the length of the body, as in the case of joists. It may be shown by mechanical principles that, with reference to the three dimensions of rectangular bars, the breaking weight may be expressed by the following formula:—

$$w = c\frac{bd^2}{l} \qquad (1)$$

b and d being respectively the breadth and depth (and are usually expressed in inches), l the length in feet, c a constant deepening on the material being the breaking weight of a bar of that material, 1 ft. long, 1 in. wide, and 1 in. deep. The consideration of the value of c for the different materials will come under the head of inherent strength, but the various applications of the principles of transverse resistance will be considered under the head of constructive strength.

4. *Shearing strains*, or strain of detrusion, when the force tends to cause the particles to slide along the plane of fracture. The ends of a tie-beam into which the foot of a rafter is mortised afford an illustration of where this force comes into play. Bolts and rivets are also subject to this strain. Like tensile strains, shearing is generally assumed to be proportional to the sectional area acted upon.

5. *Torsional strains*, tending to twist or wrench the body in a direction perpendicular to its length, as on the axles of wheels. These constitute the different kinds of strains to which materials may be subjected; but, in addition, there are other properties which must be adverted to in considering their strength. These are elasticity, ductility, toughness, brittleness, and set.

Elasticity is the property by which a body tends to return to its normal volume, and form on removing a force to which it has been subjected; and when we speak of elastic stiffness and elastic flexibility, we mean the greater or less force of the elastic reaction of the fibres of elastic solids, independently of the strains to which such reactions are due. On the laws of elasticity depend those of deflection of beams and girders and the adjustment of the co-efficients of safety.

Ductility is the property by which a body tends to *retain* permanently the change of form produced by a force to which it has been subjected.

Toughness is the union of ductility and tenacity, and *brittleness* is the uncertainty of a material to sustain rapid changes of form.

Finally, as all (solid) bodies are more or less ductile, and none perfectly elastic, when a material has been subjected to great strain, it will be compressed or extended to a certain degree, and when the force has been removed will not return to its normal dimensions. The difference between the normal and altered dimensions is termed *set*.

We have now to consider the resistances which various materials employed in architectural structures offer to the strains enumerated above, and, as these are numerous, it will be only possible to describe a few. The following is a table of the strength of some of the principal materials, taken from some recent works on the subject:—

TABLE OF THE STRENGTH OF MATERIALS.

Materials.	Tensile Strength. Tons.	Compressive Strength. Tons.	Shearing Strength. Tons.	Transverse Strength. Tons.	Weight per Cubic Foot.
STONES.	sq. in.	sq. in.	sq. in.		
Granite	...	4·80	...	0·03 to 0·2	166
Limestone	...	3·43	...	0·13 to 0·28	160
Sandstone	...	2·31	...	0·02 to 0·47	146
WOODS.					
English Oak	4,464	2·85	...	0·72	48
Red Pine	5,337	2·40	...	0·53	36
Yellow Pine	...	2·40	...	0·53	32
METALS.					
Wrought Iron	20	16 to 20	20	4·60	485
Cast Iron	7	38 to 42	8 or 9	2·85	450
CEMENTS.					
Portland (neat)	0·16	1·7	...	...	87½
Roman*	0·21	...	...	...	100
Lime Mortar	0·04	0·19 to 0·35	...	...	100

STONES.

It is only in exceptional cases that the resistance to crushing of stones need be considered. The transverse strength needs most attention, as the low resistance of stones when subject to this strain renders them wholly unfit to resist, when unsupported, direct weight. Examples of the effects of disregarding this fact you have doubtless frequently observed. The characteristics of durability and hardness of the different stones are as follows:—In granites, the more quarts and horneblende predominate, and the less the quantity of felspar and mica, which are more weak and perishable ingredients; smallness and lustre in the crystals of felspar indicate durability, largeness and dulness the reverse. In limestones, compactness is the great criterion of their durability, and, generally speaking, when the stone is very compact it is most lasting, but when porous, perishable.

Sandstones.—You are aware there are two kinds of sandstones; those in which the grains of sand are cemented by lime, and those in which the cement is nearly pure silica. It is well to note that when lime is the cementing material of the particles, the stone is very perishable near towns where coal is burned. A strong and durable sandstone is characterised by sharpness of the grains, smallness of the quantity of cementing material, and a clear shining surface. Rounded grains and a dull mealy surface characterise a perishable stone.

CEMENTS.

I have classed under this head Portland cement, Roman cement, and mortar. With reference to Portland cement, its strength will depend on the manipulation it undergoes in the process of manufacture. The surest means we have of knowing a good cement are by its weight, tensile strength, and its fineness. A good cement ought to weigh not less than 112 lb. to the bushel, or 87½ lb. per cubic foot in the dry uncompressed state of powder; its tensile strength should not be less than 350 lb. per square inch of section of a briquette of neat cement which has been immersed in water for seven days, and its fineness should be such that only 10 per cent. will be rejected by a sieve the meshes of which are not more than 1-50th of an inch in diameter. The strength of Roman cement is only about one-third that of Portland cement, and this cement is very ill-adapted for mixing with sand. The results of experiments made by Mr. Aitcheson indicate, he considers, that if the mortar has too much lime it will be about half the strength of mortar mixed in the proper proportions; and, if the mortar is too poor, the strength from ¼ to ⅓. But what he considers proper proportions is not stated. In any case these experiments want confirmation, being made on cubes measuring 1 in. on the side.

METALS.

The strengths given in the table may be taken as the mean strength; but there are special circumstances connected with the resistance of these metals which should be noted.

Cast Iron.—It has been proved by experiment that thin castings are relatively stronger than thick, and that quick cooling, repeated meltings (up to a certain number), and certain arrangements of mixtures are also favourable to strength. Also that cold-blast iron is stronger than hot-blast, but I believe not necessarily so.

Wrought Iron.—The strength of this material depends on the selection of pig-iron for its manufacture, and on the care and judgment which have been exercised in the process of conversion into wrought iron; but, speaking generally, the more workings it has gone through the greater will be its strength. It is needless to say that with architects it is almost impracticable to stipulate for the particular brands or qualities of iron. Their best course when they desire to place the strength of any piece of iron beyond question is to stipulate the test it must be submitted to before being erected. This test should include a trial of the amount of elongation as well as of tensile or compressive strength. Cast iron of a good quality will, when recently fractured, have a bright and crystalline texture, and if struck smartly on its edge with a sledge-hammer a slight indention will be produced. Wrought iron should have a clear grey colour, with a high metallic lustre, and a fibrous appearance; when the texture is either laminated or crystallised, the metal is defective.

WOODS.

The strength of timber will depend on its age, seasoning, and on the soil on which the tree has grown. Speaking generally of two pieces of the same timber, that specimen will be the stronger which has grown the slowest, and this is shown by the narrowness of the annual rings. There are some other indications of strong timber which should also be remembered:—1st, the medullary rays (when visible), should be hard and compact; 2nd, the fibrous tissues should adhere firmly together, and should show no woolliness at a freshly-cut surface, nor should loose fibres clog the teeth of the saw; 3rd, if

* Neat.—Six months immersed in water.

the wood has colour, darkness of colour is a general sign of strength and durability; 4th, the freshly-cut surface of a wood should be firm and shining, and should have somewhat of a translucent appearance; a dull chalky appearance is a sign of bad timber. This closes the remarks I have to make on the inherent strength of materials, and I will, therefore, proceed with the consideration of constructive strength.

CONSTRUCTIVE STRENGTH.

This I have above defined as the amount of effective resistance a material exerts when employed to transmit or oppose force. And as there is almost endless variety of forms into which materials may be shaped to this end, it will only be possible to mention cases which occur most frequently in practice. These are walls, arches, columns, girders, and beams. The crushing strength of good coursed rubble masonry is, according to Rankine, about $\frac{1}{10}$ that of single blocks of the stone; but the resistance of common rubble masonry is not much greater than that of the mortar. In determining the thickness of the walls an architect has only to consider the effects of crushing when designing very heavy vaults or high towers. In architectural buildings there is more liability to the walls being overturned than to their being crushed by actual weight, especially in storms, and their stability will mainly depend on their thickness, structure, and bond.

Walls. — The following convenient rule for determining the thickness of the walls of ordinary houses having stories from 20 ft. to 10 ft. high may be found useful:—"First, take a thickness of $\frac{1}{12}$ or $\frac{1}{15}$ of the total height of the external wall, reduce it in the ratio of a line drawn from its top to the bottom of the opposite wall, to which it is tied by the roof or floor, whether this is an external or partition wall: let this be the thickness of the wall for the lowest story. Calculate the thickness of the walls of the next story in the same manner from its floor, the height being, of course, lessened by that of the lowest story; and so on for each story separately,—taking care that the walls of the highest story are not so thin as to become crushed or crippled by the weight of the roof, and some allowance must also be made for the force of the wind or storms at this height."* Thus for a building 36 ft. high and 24 ft. wide, divided into three stories of equal height:—

Lowest story,—

$$\frac{36}{10} = 3{\cdot}6, \text{ then } \frac{3{\cdot}6 \times 24}{\sqrt{36^2 + 24^2}} = 2 \text{ ft. nearly.}$$

Middle story,—

$$\frac{24}{10} = 2{\cdot}4, \text{ then } \frac{2{\cdot}4 \times 24}{\sqrt{24^2 + 24^2}} = 1 \text{ ft. 9 in. nearly.}$$

And for the upper story,—

$$\frac{12}{10} = 1{\cdot}2, \text{ then } \frac{1{\cdot}2 \times 24}{\sqrt{12^2 + 24^2}} = 1 \text{ ft. 2 in. nearly.}$$

In designing enclosure walls it should be remembered that by throwing a part of their substance into counterforts much additional strength is gained, and there is, moreover, some saving of material effected.

One of the principal objects of "bond" in a wall is to enable it to resist forces tending to tear asunder horizontally. This is due to the mutual friction of the overlapping portions of the beds or horizontal faces of the stones or bricks, and it may be proved that this is increased by increasing the ratio of the length of overlap to the height of a course. This may be effected by increasing the length of the stones or bricks or diminishing their depth; but in either case the limit is fixed by the liability of the materials to break, which occurs when the length is more than a certain ratio to the depth, usually about 3. The longitudinal strength of English and Flemish bond may be taken as the same, and their transverse strength is double the longitudinal. But in the case of a wall consisting entirely of stretches the longitudinal tenacity is doubled, while the transverse is reduced to nothing. "In brickwork, therefore, in which the longitudinal is of more importance than the transverse tenacity (as in the case of furnace chimneys), a sufficient amount of tenacity is to be preserved by having courses of headers at intervals."†

Arches.—The different forms of arches we may class as follows:—Semicircular, semi-elliptical, and pointed; and with the different methods of drawing them you are all familiar. We have first to consider the proportion of the rise to the span. This, *cæteris paribus*, depends on the weight to be carried, and on the structure of the arch. The semicircular is best adapted where great strength is required; but the segmental is more generally useful, the pointed being only suitable for buildings of a decorated character. When arches are loaded (as in bridges), the proportion of the rise to the span is from $\frac{1}{4}$ to $\frac{1}{7}$, increasing with the span. The thickness of the arch depends on the rise and the weight to be supported, and on the material of which the arch is composed. The following are some proportions:—Palladio, thickness $\frac{1}{12}$ of span; Sertio, thickness $\frac{1}{17}$ of span; Alberti, thickness $\frac{1}{10}$ of span; Perronet, thickness $\frac{1}{18}$ of span. The French rule is $\frac{1}{30}$ of the span + 1·1 foot. The most preferable rules are Rankine's.

For single arches..... $T = \sqrt{\cdot 12R}$. (2)

For a succession of arches $T = \sqrt{\cdot 17R}$. (3)

R being the radius of curvature at the crown of the arch in.

For segmental arches..... $R = \frac{r^2 + s^2}{2r}$

For semi-elliptical arches $R = \frac{s^2}{r}$

r being the rise and s the half span.

Brick arches should rarely be less than 18 in. thick, and 18 in. will be sufficient for arches up to 36 ft. span. Invert arches are used for the purpose of distributing pressure. For ordinary purposes two half-brick rings will be sufficient, but for heavy goods three half-brick rings; and the arc of the curve should not exceed 180° nor be less than 45°.

In constructing arches, it should be kept in mind that, as in semicircular and segmental arches the joints should radiate, and in semi-elliptical arches each joint should be perpendicular to the tangent of the intrados, at the point thereon from whence the joint starts. In stone arches the voussoirs being cut to the shape required by the curve, the jointing presents no difficulty. In the case of brick arches, however, if the mortar-joints are continuous, they will be thicker at the extrados than at the intrados; and as the crushing-weight of mortar is very small, the work will be liable to excessive settlements. This may be remedied by building the arches with gauged bricks; but this is a costly expedient; or by building the arch in concentric rings, each ring of bricks having their lower edges touching. This method should not be practised in arches over 36 ft. span, as there is the danger of the concentric rings settling unequally, throwing the whole strain on one ring.

"The best plan, therefore, except in very flat arches, in which the length of extrados and intrados differs but little, is to build the arch in concentric rings, separated at short intervals by blocks of brick built as solidly as possible, or with bricks specially gauged."*†

* Roorkee Treatise on Civil Engineering. Vol. ii. p. 9.
† Rankine's Applied Mechanics, p. 224. Ed. 1859.

THE PARLIAMENT OF ENGLISH WORKMEN.

THE artisans and labourers of Great Britain are too often challenged with unthriftness, but the annual meeting of the chief friendly or provident societies that took place, according to custom, on Whit-Monday, gave evidence against the charge. It should also be considered that our mechanics, in a great measure, are affiliated to trade unions; and their weekly subscriptions to provident and trade societies absorb about 5 per cent. of their earnings if in constant work; but, taking into account loss of time, it would be a fair average to state 6 per cent. Apart from this,—and particularly so in the building trades,—there is scarcely a "pay-table," but a generous subscription from pence to silver is the cheerful rule for mates in unmerited difficulties, or their widows.

Foremost amongst the friendly societies is the Manchester Unity of Oddfellows, and their "oddness" consists in banding no fewer than 502,000 members, with a rest of 3,706,336*l*. Of all building trades, the stonemasons are chiefly affiliated here, and the Oddfellows are wise enough not to expend their funds in tomfoolery dresses, pageants, and what is properly designated "monkeys' outings."

Two other orders of Oddfellows, the "Grand United" and the "National," also held their "Parliament" in Whitsun week, and their statistics for the year show that they are growing. The "Grand United" totals up 94,224 members, with a capital of 430,000*l*. The "National" counts 41,364 members, and 94,302*l*. of accumulated funds.

The "Druids" met at Darlington, and number in England and Wales 58,852, and out of England they calculate 20,000 members more.

The city of Bristol welcomed the "Shepherds," who muster in their fold 60,517 "crooks," with a capital of 74,000*l*.

The "Free Gardeners" had a conference at Newcastle, and this society is going ahead, for during the past year they have added 2,000 to their garden, and enjoyed the rich produce of 41,303*l*., from which they have been enabled to bank for the year 5,000*l*.

Besides these widely-ramified benefit societies, many others of a kindred character have met, and each is in a good state of health.

Then, again, there are the parochial clubs, slate clubs, whip clubs, accident clubs, burial clubs, dispensary clubs, and many others that comprehend working men; and even the women and children of the sons of toil have penny clubs for clothing.

In the aggregate, we find congregations of workmen devoting the little leisure they find to hand at Whitsuntide to the nobler purposes of making for themselves and others a provision for illness, or the wear and tear of toil and age.

* Roorkee Treatise on Civil Engineering. Vol. i. p. 283.
† To be continued.

ASSOCIATION OF SANITARY INSPECTORS FOR SCOTLAND.

THE first annual meeting of the above Association was held on the 2nd inst., at the Old Council Chambers, Broad-street, Stirling, under the presidency of Mr. Kenneth Macleod, of Glasgow. The Association, which has only been in existence since February last, numbers 102 ordinary and 73 honorary members. Representatives from the principal cities and towns in Scotland were present.

After the transaction of some routine business, followed by an address from the Chairman, Mr. Welsh, of Perth, read a paper on the "Removal of Waste or Foul Water from Dwellings, and the Cleansing of the Surface of Streets." In the course of his remarks he alluded to the great mortality resulting from typhoid or enteric fever, said to be generated by the escape of foul sewage-gases into imperfectly constituted dwellings, and reminded the Association that, could they succeed in devising means whereby this unseen deadly agent could be satisfactorily overcome, they would to a great extent have fulfilled the object of their organisation. After showing that the old system of open sewers was not really a remedy for the evil, and expressing the opinion that if some improvements were made, the underground drainage was the best for the removal of soil-water, Mr. Welsh proceeded to describe his plan in detail. Assuming that a city had its drainage system complete, he asked, how could the drains be kept from becoming foul by the decomposition of animal and vegetable matter, and the consequent generation of sewage gas? His reply was, "Let cisterns be placed at as great an elevation as possible,—say in the attic of the properties, at the extreme end of the side-drain, and let them be capable of holding 100 gallons of water. Have pipes of as large a diameter as possible, so as to approach or be of the same size as the side-drains, and let them form the connexions between the cisterns and the drains. Let the valves be of a size equal to the connecting-pipes, and let the cisterns be discharged into the drains twice a week, or oftener if need be. With such a quantity of water, and discharges at an elevation of 20 ft., 30 ft., or 40 ft., the presumption is, that it would be impossible for any matters, either animal or vegetable, to resist such a current, coming with such a force from either of the fore-mentioned elevations, or remain in a drain so operated on." Supposing circumstances favoured the adoption of the plan, Mr. Welsh entered into a calculation to show that with the payment of wages and the cost of water this system of flushing might be carried out at an annual cost to each proprietor of only 10*s*. In very many cases, too, it would be much less, as in the more densely-built parts of a town it frequently happened that the properties of two or more proprietors were drained by the same side-drain; consequently, the greater the number the less each would have to pay. In considering the subject of the surface cleansing of streets, he advocated the water-jet as the best means of doing the work,—not alone, but by the aid of the broom. He pointed out that

the pest places in which fever originated, and from which it spread to other more healthy localities, were the spots in which the jet, and not the broom, could have any effect in the matter of cleanliness. The scavenger's broom, in places such as he had described, where oftentimes 150 or 200 human beings were crowded together,—not to mention the large percentage of cats and dogs,—by partial removal only made matters worse. Nothing but the jet could make the desired improvement in such places, and improvement it really did make, as evidenced after the operation by the paving stones appearing as clean as the day they were first laid down. The good effects of washing out closes and narrow streets were not confined to the mere cleaning of the surface, for the filth having been washed away, the exhalations which formerly arose from it ceased to enter the houses, and consequently the air was much purer, and an improved state of the public health must be the result. Mr. Mackieson, of Dundee, followed with a valuable paper, entitled "General Observations bearing on Public Health in Towns," in which he alluded to the advantages of hospitals in preserving the health of communities by the collection, isolation, and cure of infectious diseases. He also suggested co-operation in sanitary work between the authorities in different districts, expressed his ideas on the subject of ventilation, and pointed out the beneficial results of public baths, and similar places, whereby habits of cleanliness might be inculcated among the children of populous cities. Votes of thanks were tendered to the readers of the papers, and Perth was fixed upon as the place for the next annual meeting.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THEN: AND NOW.

TUESDAY, the 15th of June, was the fortieth anniversary of the opening general meeting of the Institute in 1835, Earl de Grey, as president, in the chair. The society then consisted of fifty-three fellows and fourteen associates. Of these fellows only six now survive,—Messrs. Blore, D. Burton, Donaldson, Poynter, Railton, and Thomson; of the associates only two survive,—Messrs. A. Burton and H. E. Kendall, jun.; and also G. Godwin, who was the first medallist, for his Essay on Concrete. There were then six honorary fellows, two honorary members, and sixteen honorary and corresponding members, *all* of whom are dead.

The Institute now consists of 296 fellows, 12 honorary fellows, 8 honorary members, 69 honorary and corresponding members, and 291 associates, making in all 877 members in 1875, instead of 91 in 1835, with the addition, at present, of 9 contributing visitors, and 34 students. In 1848 the first royal gold medal was awarded, and of this there have been 27 recipients, of whom 11 are dead.

T. L. D.

BUILDING ON IMPROPER FOUNDATIONS.

WE have often taken occasion to condemn the practice on the part of a certain class of builders of removing the gravel or sand from sites on which they are about to build, and supplying its place with any rubbish that may be obtainable, oftentimes rotten and decomposing matters which afterwards fill the houses built over them with dangerously injurious gases. The Hackney *Gazette* points attention to instances of this practice in its own locality:—"We paid a visit the other day," says the writer, "to one of these places—situated behind some dwellinghouses in Albion-road, Stoke Newington—and found the state of things fearfully disgraceful. Dust, decaying vegetable matter, and fish offal had been shot by wholesale into the hollow, and the stench was literally intolerable; indeed, it could scarcely be expected that the locality, with such a fever bed in its midst, should remain a day free from disease. Upon inquiry, we ascertained that the refuse had been brought into the district by a dust contractor from Clerkenwell and Islington. Surely, this is too bad. We have dust, house refuse, and offal enough in Hackney without having them imported from neighbouring districts; and it does seem a scandalous thing that we should be compelled to receive *nolens volens* the materials of *disease*-production which properly do not belong to us. The nuisance has become so utterly intolerable that the inhabitants of the adjoining houses have, we are glad to learn, memorialised Dr. Tripe, our Medical Officer of Health, on the subject; and we are watching to see whether, and when, the injurious matter will be removed. And on such heaps of accumulated rubbish, highly charged with fever germs, houses are to be built, and the people are expected to be healthy even though the most simple sanitary conditions are neglected by those who ought most scrupulously to regard them. Nor are these heaps of rotten cabbage and fish to be found at Albion-road, but in South Hackney, Clapton, and elsewhere, whilst refuse of all descriptions is to be seen, especially after the Saturday marketings, strewn in nearly every street in the entire district."

THE METROPOLITAN RAILWAY COMPANY'S NEW STATION IN BROAD STREET.

THE new station of the Metropolitan Railway Company at the angle of Broad-street and Liverpool-street, opposite the large new City terminus of the Great Eastern Company, is now fast approaching completion, and is intended to be opened for traffic about the 1st of July, simultaneously with the opening of the Great Eastern Company's Liverpool-street terminus, which is also now almost finished. The Broad-street terminus of the Metropolitan Company is one of the largest along the line, and the station building is a bold-looking structure, harmonising with the several buildings of a similar character in the immediate neighbourhood. With the completion of the Metropolitan Company's terminus there are now four leading stations in Liverpool-street and Broad-street, in immediate proximity with each other—namely, those of the London and North-Western Company, the North London, the Great Eastern, and the Metropolitan Companies. The principal elevation of the station building is in Broad-street, where there are two entrances, with an exit passage, together with another entrance at the angle of Broad-street and Liverpool-street. All these several entrances are 7 ft. in width. The Broad-street frontage is 88 ft. in length, and 46 ft. in height, containing the ground-floor and two stories above, with an ornamental Mansard roof at the corner of Broad-street and Liverpool-street, 58 ft. in height, and surmounted by a cresting of ironwork. The return elevation into Liverpool-street is 56 ft. in length, and uniform in its general architectural features with the Broad-street frontage. There is also a frontage to the railway corresponding, to a certain extent, with the Broad-street elevation, but plainer in its character. The several frontages are faced with brick and Bath-stone dressings, and the range of windows in the ground and upper floors are all arched. The entire area of the ground-floor will be set apart for the Company's purposes, and will contain a spacious booking-office, 50 ft. in length, and 30 ft. in width, with clerks' offices, and waiting-rooms. The upper floors will be let as offices, with an entrance at the north end of the Broad-street frontage.

Flights of stairs on each side of the booking-offices lead down to the railway level and the station area. It is 78 ft. in width, with an extreme platform length of 390 ft. It is covered in for a length of 190 ft., by a roof consisting of iron and glass, supported on one side by strong retaining walls, and on the other by iron columns and girders, with a lattice girder at the east end. In addition to the roof the station is also covered in to a length of 95 ft. by Broad-street, and the station building, under which the railway passes. Broad-street is carried over the line by massive iron girders, and the station building likewise rests upon girders of a similar character. There are two platforms, the one being 24 ft. and the other 18 ft. in width, with a length, as above stated, of 390 ft.

The whole of the works, including the station buildings, have been designed and carried out under the superintendence of Mr. Edward Wilson, the engineer to the company, the contractors being Messrs. Kelk & Lucas.

Langton Maltravers.—A new church in this village is in course of erection, at an estimated cost of 3,500*l*. The walls are just beginning to rise from the ground, and on May 24th a memorial-stone, of polished Purbeck marble, was laid at the east end, by the Countess of Eldon. The work is being carried out by Mr. T. Gerrard, under the direction of Mr. G. R. Crickmay, architect.

LONDON TREES.

UPON the principle of remembering to lock the door after the steed is stolen, I prognosticate that at some future time our metropolitan gardens will be furnished with an underground network of water service-pipes, just as a large building is often pervaded with gas tubing, leading to a multitude of points where supply is needed. By the illustration of the steed being stolen, I mean to hint at the death of all the finest trees through drought,—an evil which might be warded off if such systems of water service to the roots were established in due time.

In practice in my own garden of a quarter of an acre, I establish cisterns not too soundly water-tight in different points, the lower supplied from the higher by small gas tubing at 2d. per foot. If required, water can be dipped out with a watering-pot in the neighbourhood of any small pet plants which the gardener may take an interest in; meanwhile, whether the gardener takes any pains or not (he will almost, as a matter of course, neglect the big trees), the leakage is insensibly,—or rather I may say, in the long run, *sensibly*,—preserving the general health and verdant appearance of such vegetation as is of larger growth than a cabbage.

G. M.

A ROYAL RESIDENCE IN IRELAND.

MR. STACPOOLE intends to move on Friday next, June 25th, in the House of Commons, "that an humble address be presented to her Majesty humbly representing to her Majesty that it would conduce to the advantage of the Crown, and tend to promote universal satisfaction in Ireland, if her Majesty had a permanent residence in that country; and that this House, feeling deeply its importance, will cordially co-operate with her Majesty in any step she may be graciously pleased to take to carry out so desirable an object." In reference to this subject we may add that a rumour is afloat to the effect that a residence is to be purchased in Ireland for his Royal Highness the Duke of Edinburgh.

SANITARY STATE OF THE MINING VILLAGES.

AMONG the "notices of motion for which no days have been fixed" in the House of Commons' book, is one in Mr. Macdonald's name, "to call attention to the sanitary condition of the mining villages of England, Scotland, and Wales, and the tenure by which the houses are held by the workmen, and to move a resolution on the subject." The state of many of these villages is a subject well worthy the attention of Parliament and the country, as we have often pointed out.

RE-BUILDING OF THE ROYAL ASYLUM OF ST. ANNE'S SOCIETY.

IT is stated that, in consequence of the schools at Streatham of the Royal Asylum of St. Anne's Society being now too small for the number of pupils, and there being a difficulty in providing further accommodation, a new and much larger building is about to be erected on Banstead Downs, and that an eligible site has been obtained on favourable terms. Under the contemplated new arrangement, the present school buildings and ground at Streatham are to be sold, and as land in that locality is much increasing in value, it is expected that the proceeds of the sale will amount to a large proportion of the cost of the new establishment.

THE CHARLES KNIGHT MEMORIAL.

ON the 14th inst. some of the members of the Charles Knight Memorial Committee attended at the Windsor Guildhall, and presented a bust of the late Charles Knight, by Mr. Durham, to be placed in the Town-hall of the borough, of which Knight was a native. It stands between the two lower windows of the council-chamber, on a pedestal a little over 3 ft. high.

"A Subscriber" writes to us expressing his surprise that he was not informed of what was going to be done. He will be less surprised, perhaps, when we tell him that some members of the committee even were kept entirely in the dark as to the progress of the affair, and had no intimation whatever as to the day of presentation. Under proper management a much more worthy demonstration would have been made.

ASSESSMENT OF DULWICH COLLEGE.

THE parish officers of the Camberwell Vestry have just increased the assessment of the new Dulwich College buildings and grounds from a ratable valuation of 2,000*l.* to 3,750*l.*, or nearly double the former assessment value, which it is said will very seriously cripple the College, more especially if the proposed new scheme should be adopted, under which 1,400*l.* annually is all that is allowed for the rates, taxes, insurance, and all the general expenses of the establishment. Taking the average rate per pound, payable on the assessment in the parish of Camberwell, at 5*s.*, the College liabilities under the new assessment, will amount to about 940*l.* a year for rates alone, leaving only 460*l.* to pay for the whole of the other expenses, should the new scheme come into force.

"THE SALE OF SERJEANTS' INN."

SIR,—The *Manchester Guardian* put forth a strange fancy, to which you have been induced to give currency in your paper of June 12, namely, that "the Judicature Bill (Act) has abolished the title of Serjeants-at-law." The Judicature Act has done nothing of the sort. It merely declares (sec. 8) "That no person appointed a Judge of either of the said Courts shall henceforth be required to take, or to have taken, the degree of Serjeant-at-Law." The sale of Serjeants' Inn, and the division of its proceeds among existing Serjeants, are, therefore, odd, and not well warranted, anticipations. Was "the wish the father to the thought"? SERVIENS.

THE WORKS OF THE LATE MR. PUGIN.

SIR,—In your list of the works of the above, I notice St. Joseph's Retreat, Highgate. This is a mistake. The only buildings erected there under the superintendence of an architect are a small chapel on the west side of the church, and the monastery, now in course of erection, both from my designs. The church was built some years ago, by Mr. Bird, the builder, without professional superintendence. FRANCIS W. TASKER.

COLOURING STONE.

I AM building a house in the country of brown stone, with window-cills, mullions, chimneys, &c., of white, or rather drab-coloured freestone. Can you kindly tell me in the columns of your paper how I can best colour the freestone *otherwise* than with paint, which, of course, I do not wish to use, so that it shall be of the same shade, and harmonise with the rest of the building; for I do not at all like the contrast between the two stones, and am not content to wait for time and weather to do the work.
HUSSAR.

ARLESEY SCHOOLS ESTIMATES.

THE SEQUEL.

1,925*l.*
THE King has since the job declined,
'Cause in his price he could not find
A profit suited to his mind.

2,185*l.*
But Twelvetrees, ever sure and true,
The work has since agreed to do,
For three pounds over eighty-two.

Arlesey Asylum. LUNATIC.

ONE BUILDING OR TWO?

IN the Court of Exchequer last week, the British and Foreign Bible Society objected to the assessment for inhabited house duty of half their premises in Queen Victoria-street. The whole building was assessed at the sum of 3,200*l.* By the requirements of the Building Act, in consequence of the magnitude of the structure a party wall was made, which ran from the top to the bottom and from the back to the front of the building. In one portion, Mr. Ekerstein, the secretary, resided with his family, and the Society did not dispute their liability in respect of that half. On the other side the building was occupied as warehouses solely for the purposes of trade, but there was communication between the two halves by an iron door, which was closed at night. The contention on the part of the Society was that, as this building was separate and distinct, they were exempt from duty in respect to it. On the part of the Crown it was urged that, being one block of building, duty must be paid on the whole.

The court agreed with the Society, and reduced the assessment by one half.

Acton Local Board.—The surveyor's salary has been increased 50*l.* a year, in consequence of his long service.

CHURCH BUILDING NEWS.

Charlton (near Tetbury).—This church, which is dedicated to St. John the Baptist, is in the Early English style, and consists of a nave, from the south-west corner of which rises a square tower containing five bells, a chancel, and chancel-aisle. The edifice being much dilapidated, Mr. M. Wyatt, of London, architect, was communicated with, and he made plans for the restoration, and the work was entrusted to Messrs. Wall & Hook, builders, of Brimbscombe. The principal feature in the church is the row of pillars dividing the two aisles, which together form the body of the church; these, together with the arches, have been cleaned of the white-wash, &c., and the stones shown in their natural state. The pulpit has been removed from the north wall of the nave, and an unused doorway, which was in the wall behind it, has been opened, and forms one of the entrances to the church. There has been one new west window. The roof-timbers have been cleaned of the whitewash, and shown in their proper colours; the old pews have been replaced by modern oak benches, and the aisles have been paved with red and black tiles in squares. The chancel has been restored and embellished. On the south side originally stood a doorway which was unused; but this has now been opened, and forms the entrance to a new vestry about 7 ft. square, which has been added to the building. Under the vestry is a heating apparatus, by Haden, of Trowbridge. Between the chancel and the chancel-aisle there originally was a large buttress, and a monument to the memory of Sir Henry Knyvett and his wife; but the buttress has been abolished and the monument removed back against the north wall, their places being taken by the springing of two arches to carry the roof. The old two-light east window has been replaced by a stained glass window, containing three lights. The chancel-aisle contains the seats for the choir, and the old Early English east window has been filled with stained glass.

York.—The church of St. Martin-cum-Gregory, at the foot of Micklegate-hill, was re-opened on the 20th ult., after a thorough internal restoration. The church has an Early English nave, with Perpendicular clearstory and chancel, and some Decorated windows. There are also traces of a crypt, and in the west wall is a rude piece of Roman sculpture. The old square pews have been removed; the old gallery in the west tower, with the organ, taken down; and the whole of the area of the church cleared. The floor has been taken up, levelled, and laid down in concrete, with red and black tiles placed diagonally. All the columns and the arcades and the walls have been scraped and cleansed, and repaired where decayed. The central roof of the nave, which is divided into panels, is renovated, the woodwork being painted oak, and the spaces within coloured blue, the bosses being picked out in gold. The new seats are of pitch-pine, open with square ends, and are ornamented with carved Maltese crosses within a circle. Book-boards are provided. The old hexagonal pulpit of oak has been denuded of paint and varnish, and the carved work made apparent. Gas standards have also been fixed in the church, from the establishment of Mr. Dovery, of Manchester. The church will be warmed by two of Gurney's patent stoves. The cost has been about 1,000*l.* Messrs. Atkinson, architects, of this city, prepared the plans and drawings for the restoration, and under the personal supervision of Mr. Demaine the works have been executed by the following tradesmen of this city:—Mr. Clark, mason and builder; Mr. Coulson, joiner; Mr. Michael Varvill, plumber and glazier; Mr. Knowles, decorator; Mr. Hewitt, and Mr. Pearson, painters.

Stogumber.—This parish church, a specimen of the Perpendicular style peculiar to Somerset, having undergone restoration, was re-opened on the 28th ult. It consists of a nave, north and south aisles, two south-west and east chapels, a chancel, and north and south porches. The restoration includes a new roof to the south aisle, a facsimile of the old. The old roofs of the nave and north aisle have been retained so far as it was possible to do so. The walls have been stuccoed, and the windows reglazed with cathedral glass. All the seating, which, with the exception of a small portion, is ancient work, and the stall-ends, in varied designs, have been refixed. The old floors have been removed, and the vaults underneath filled up. New floors throughout the church, lowered to the original level, have been laid with encaustic tiles. The chancel was rebuilt some few years since, but new encaustic tile floors have been laid down. The Halsway Chapel, on the north side, has been restored, with new oak seating and tile floor, and a stained-glass memorial window, by Clayton & Bell, in the east end; and new open-work roof, with moulded ribs and carved bosses at the intersections, a copy of the old work. The Notley Chapel, on the south side, which is Early English work, is being restored by Mrs. Notley, of Combe Sydenham. The cost was about 2,400*l.* The works have been carried out by Mr. Henry Davis, builder, of Taunton, aided by his son, Mr. A. P. Davis, who acted as resident superintendent under the direction of Mr. J. D. Sedding, architect, of Bristol.

Brodsworth (near Doncaster).—This church was re-opened, after restoration, on the 24th ult. From the discoveries of Saxon masonry made during the restoration, it is evident that a church existed here as far back as the Saxon era. The date of the erection of the present edifice has been fixed as about 1120,—and the building was in the Norman style. The works comprise the rebuilding of the south of the nave and chancel, with a new south aisle and porch, and a south chapel to the chancel; the restoration of all the old work, and new fittings. The tower has been heightened, a new west window inserted, and the bells re-hung. The old stone-work of the nave and chancel arches has been cleared of colour-wash. A large number of incised and raised crosses, of various dates, were found built into different parts of the old walls, and these have been built into the walls of porch, vestry, &c. The old carved oak pulpit of 1692 has been erected in the north-east corner of the nave. The pavement is of tiles, by Godwin, of Hereford. The church is heated by hot water, on the system known as Perkins's patent, by Mr. R. R. Gibbs, of Liverpool. The bells were re-hung by Mr. Thomas Mallaby, of Masham. The edifice has been newly roofed with pitch-pine, and seated with stalls of the same material. It has sittings for 200 hearers. The cost of the restoration has been about 2,500*l.*, borne chiefly by Mr. C. S. A. Thellusson, of Brodsworth Hall. The architect was Mr. C. Hodgson Fowler, of Durham, and the contractors were Messrs. Longmire & Burge, of London.

Monkwearmouth.—St. Peter's Church has been re-opened for divine worship, after having been closed for three years, during which it has undergone a complete metamorphosis. Some portions of the old walls are retained, and form a striking contrast to the other parts. At the end of the last century the arcade separating the nave from its aisle, together with the chancel-arch, were destroyed, a low-pitched roof was put on with a flat ceiling, and the church was fitted up with pews and galleries, whilst the churchyard was overlaid with 6 ft. or 7 ft. of ballast, and a fresh stratum of burials took place over the whole area. The church thus became damp and neglected. In 1866 it was decided to bring back the church as far as possible to the arrangement it presented in the fourteenth century, after the addition of the north aisle, chancel, and chantry, to the original Saxon fabric. The south wall of the nave has been rebuilt on the old foundations, and the arcade and chancel-arch have been reconstructed on the old lines. Vestries are built at the east end of the aisle. The church will hold about 600 worshippers, and the principal entrance is by the north porch, in which the fourteenth-century doorway has been built up again, the old stone roof being put on. The roofs of the church are high-pitched, that of the nave following the old lines given by the remains of the Saxon fabric. They are all open-timbered except that of the chancel, which is polygonally boarded. The expense of the restoration has been about 7,000*l.* Mr. R. J. Johnson, of Newcastle, was the architect. Mr. Hudspith of Newcastle, was contractor for mason's work, his representative on the spot being Mr. Birkett. Mr. Caldcleugh, of Durham, executed the carpenter's work; and the other contractors were—Mr. Preston, for slating; Messrs. Wilkinson, for plastering; Mr. Gibson, for plumbing; and Mr. Morrison, for painting and glazing. The stained glass and painting of the roof were the work of Mr. C. E. Kempe, of London.

Elgin Joiners.—After a strike of three hours' duration, the joiners of Elgin have had their wages raised from 4*d.* to 6*d.* per hour, and the master-joiners have intimated that in consequence of this rise they will raise their charges by 5 per cent.

Books Received.

The Law and Practice relating to Letters Patent for Inventions. By W. FISCHER AGNEW, Barrister-at-Law. London: Wildy & Sons, Lincoln's Inn-archway.

MR. AGNEW has included in his volume notices of the Patent Laws in force in the principal foreign States, and gives in an appendix the statutes in full. Those who in the present disturbed state of the question desire to know exactly what is, in order to compare it with what may be proposed, will find this book useful. The endeavours which are being made on various sides to damage the position of inventors require to be met earnestly.

Engineering Papers. By C. GRAHAM SMITH, C.E. Spon, Charing-cross. 1875.

THIS little volume comprises three papers by Mr. Graham Smith, read at the Institution of Civil Engineers and other societies, the subjects being "Mortar," "Practical Ironwork," and "Retaining Walls." The author takes a clear-headed view of his subjects, and conveys succinctly a considerable amount of useful information.

The Wedgwood Handbook: a Manual for Collectors. By ELIZA METEYARD. London: George Bell & Sons. 1875.

MISS METEYARD has thrown herself so fully into the life, works, and time of Wedgwood,—has devoted so much attention, acumen, and, we fear we must add, money, to rightly illustrating them,—that she was well fitted to produce such a handbook as that now before us. And a very useful handbook it is: it treats of the marks, monograms, and other tests of the old periods of manufacture, and includes the catalogues with prices obtained at various sales, together with a glossary of terms. The author does not claim too much when she says, that the major part of the book "is the result of study, of observation of the finest collections, and of materials gathered from original documents." A much-needed want has been well supplied; and we trust that those who are interested in such subjects will show their appreciation of Miss Meteyard's industry and knowledge by buying the book. They will not regret doing so.

Miscellanea.

The Windsor Drainage.—Mr. Acock, the contractor, has commenced within the last week or two the works connected with the Windsor drainage, by sinking two shafts in the Albert-road, where it is proposed to carry the drain through a tunnel at a depth of 40 ft. below the surface. The work about to be constructed consists of an outfall sewer from Brook-street to the Ham, the contract for which has been taken by Mr. Acock, for about 17,000*l*. The sewer will be circular, 4 ft. 6 in. in diameter, and will be constructed of stock bricks in lias lime cement, and will have a fall of 3 ft. to the mile. In places there will be three rings to resist extra pressure of subsoil water. To defray the cost of the works the Sanitary Authority proposes to borrow about 30,000*l*., which it is estimated the works will cost. The Local Government Board have given permission to borrow 10,000*l*. for works within the borough, that is from Brook-street to near the Wheatsheaf, Old Windsor, and the Public Works Loan Commissioners have granted a loan to that amount to be repaid in thirty years, in equal payments of 540*l*. The remainder of the money will, no doubt, be granted upon the same terms, and according to a statement made at a recent meeting of the Board, the repayment of the 30,000*l*. would amount to a rate of sixpence in the pound.

Conversazioni.—The President and Council of the Royal Institute of British Architects will hold their annual *conversazione* on Wednesday evening, the 23rd inst. On the same evening there will be an informal gathering for conversation of the Royal Society, Burlington House. The Society of Arts' *conversazione* will take place at the South Kensington Museum on Friday, the 25th. There will be a vocal concert in the Lecture Theatre on this occasion. The next *conversazione* of the Society for the Encouragement of the Fine Arts will be held on Thursday, the 24th, at the South Kensington Museum.

The Dwellings of the Poor.—On the 9th inst. the occupiers of a number of small houses in Wood's-place, Coppice-row, and Vinegar-yard, Clerkenwell, were served with notices by the agent of the Marquis of Northampton to give up possession forthwith. The houses, as a rule, afford accommodation for several families in each, and the announcement that they were required to leave caused a great deal of excitement and consternation in the locality. In Back-hill and Somerset-street the material of 150 houses has been announced for sale preparatory to their demolition to make room for street improvements, and the occupiers—nearly all poor Italians—are under notice to leave. The Metropolitan Board of Works has given notice of its intention to acquire possession of a block of buildings known as the "Rookeries of Clerkenwell," in order to form a new street, but they will in this case give reasonable time for the inhabitants to remove. The contemplated demolition of so many houses in an overcrowded neighbourhood will cause much inconvenience and distress to the working classes in the district.

London and Middlesex Archæological Society.—A general meeting of this Society was held last week in the Great Hall of Christ's Hospital, the Rev. G. C. Bell, head-master, in the chair. Mr. H. C. Coote, F.S.A., read a paper "On the Charters and Records of Christ's Hospital." The lecture was illustrated with a number of old records of the institution. At the conclusion, Mr. Alfred White, F.S.A., read his paper "Upon Newgate-street and the Neighbouring Wards." He maintained that the Romans did not occupy Newgate-street, as had been stated by Mr. Black and others. With regard to the old wall of London, he did not believe it was of Roman construction, it being of a later period than the Roman era. The Rev. T. Hugo contended that the wall to which Mr. White had alluded was of Roman construction. Mr. Crace next gave a short account of the early period of Christ's Hospital, and the chairman delivered a short address on the present building and other interesting details connected with the institution.

Brussels International Exhibition, 1876. An International Exhibition will be held next year in Brussels, under the patronage of his Majesty the King of the Belgians, and the presidency of the Comte de Flandre. The Exhibition, the initiative in which has been taken by the Belgian Société Royale de Sauveteurs, will include all matters relating to the saving of life, and the lessening of suffering under every circumstance, whether arising from war, fire, or shipwreck, accidents by machinery, railway, locomotion generally, or in mining operations. In addition to the above, the programme, which is very comprehensive, and invites the co-operation of men of science and philanthropists, comprises all matters relating to the preservation of health, including the proper construction of public buildings, factories, &c., and the improvement of the dwellings of the working-classes generally. A Congress will be held in connexion with the Exhibition for the discussion, by representatives of all nations, of the subjects coming under each section of the programme.

King Arthur and Knighthood.—A paper on these subjects was read by Dr. Phené on the 10th at the Royal Historical Society, Chandos-street. The lecturer considered that there were evidences to warrant his concluding that the term "Arthur" was one under which various chieftains and petty knights embarked in the new Christian chivalry, which convert kings were obliged to assume in defence of their new faith. That probably the first in order, or the chief of these kings bore that name,—if, indeed, it were not borrowed from a more ancient source;—that it was used to indicate an order, and to avoid invoking the more sacred name; that the "round tables" were of two kinds, the first consisting of chiefs and kings, which seldom met, and then only to arrange uniformity of action; the second consisting of a king or chief, with his knights and followers. We do not find ourselves able to go with the lecturer in this view. The paper included some curious matter.

Accident to Houses in Birmingham.—On the 7th inst. an accident of a rather serious kind happened in Loveday-street. The roofs of two houses, Nos. 32 and 33, suddenly collapsed, endangering the lives of several persons. Complaints as to their unsafe condition had frequently been made, but the premises had never been effectually repaired.

Loans to Sanitary Authorities.—The Local Government Act, 1858, which authorized local boards to procure provisional orders whereby the Lands Clauses Consolidation Act, 1845, could be set in motion, has caused extensive street improvements to be carried out in many provincial towns, and for this purpose loans to a considerable amount have been necessary. To repay these sums in the maximum period of thirty years, when the improvements were good for all time, especially where wide streets have been substituted for narrow and inconvenient ones, was considered a hardship on the present generation of ratepayers. The borough of Derby felt it to be so two or three years ago, hence the Council originated a movement for getting the law altered, so that sixty years might be given instead of thirty. The Local Government Board have, after considering the application of the Derby sanitary authority, now granted an extension of time to sixty years from the original date of borrowing, in respect of a balance of nearly 50,000*l*. for widening streets.

The New Gaol, Odiham.—At a special meeting of the Town Council, on the 1st inst., the Mayor presiding, the Gaol Committee recommended that 1,000*l*. be paid to the contractors for building the new gaol on receipt of a certificate from the architect that 1,250*l*. worth had been done. Alderman Hellard, in moving the adoption of the recommendation, expressed regret that more satisfactory progress had not been made in the building of the gaol. Mr. Cunningham seconded, observing that the plant had cost a large sum, and that the contractors understood that they were to be paid for it. Alderman H. Ford and Mr. Nance contended that the restrictions placed on the contractors were very hard, and tended to delay the satisfactory progress of the works. Mr. Newland thought they should strictly adhere to the conditions of the contract, and if it was a hardship on the contractors it was a pity they contracted. On a divison, the resolution was carried by a large majority.

The Late Mr. Richard Burchett.—The public lost a long-tried, faithful, able, and zealous servant when this artist died in Dublin the other day, in the fifty-seventh year of his age, having been considerably more than a quarter of a century Head Master of the School of Design, at South Kensington, or in an analogous position to that one, and in effect the principal conductor of the whole of that scheme of technical education in drawing and in decorative art which works under the Art Department. Mr. Burchett was born in Brighton, and came to London with no advantage, either of education or position. It was about 1841 that he entered the School of Design, then established under the Board of Trade in Somerset House, and occupying the rooms built for the Royal Academy. He studied here, and distinguished himself so considerably by industry, intelligence, and especially by his attainments in geometry, that he became a sort of unofficial master before he took office at all.

Important to Masons and Others.—At the Edinburgh Small-Debt Court on the 7th inst., Messrs. Boyd & Donald, justices of the peace, on the bench, Catherine Small, James Craw, John Farrell, Thomas Vallance, and Robert Edmunds, occupiers of tenements 1 and 2, Dunbar-street, sued David Thornton, mason, 11, Spittal-street, for 5*l*. each in respect of damage done to food, clothing, and furniture, in consequence of defender having failed to give pursuers sufficient warning that he, or those for whom he was responsible, were about to repair a chimney stack of said tenement, whereby a quantity of rubbish came down their chimneys. After an explanation had been given as to the amount and nature of the damage, the Bench awarded Small and Vallance one guinea each with expenses, and the other pursuers half a guinea each with expenses.

The Rebuilding of the Marylebone Workhouse.—On the 11th inst., at the meeting of the Marylebone Vestry, Professor Marks asked if a report that had appeared in the newspapers, stating that it was the intention of the Guardians to rebuild the Workhouse at an expense of 30,000*l*., was true. Mr. Boulnois said it was true that the Guardians do intend rebuilding the Workhouse, but he doubted whether the work could be done for 30,000*l*. He would say that the work would be proceeded with very slowly, and what they did last week was simply to resolve upon a further extension of the building operations.

Opening of the Lewes School of Art.—The first building erected as a school of art in Sussex, and we believe in the southern counties, was opened recently at Lewes. The work has been some time in progress, but at the present moment the building stands a finished monument to the persevering energy of those gentlemen who some years ago determined that the Lewes School of Art should have a local habitation, instead of being distributed about the town in rooms lent by other institutions. The building has been furnished throughout with every necessary appliance and convenience; and on the occasion of the opening, a selection of works of the pupils, to which prizes and certificates have been granted, was exhibited in the two principal apartments.

The late Mr. W. Scott, Contractor.—After having been laid aside by illness for some time, Mr. W. Scott, contractor, died on Friday week at his residence, near Glasgow, in the sixty-fifth year of his age. A native, we believe, of Kilmarnock, Mr. Scott began life as a joiner. By dint of energy and perseverance he by-and-by found himself in a position to enter upon railway contracts. Among other railway works which he subsequently executed were a portion of the Biggar and Peebles line, and certain sections of the Highland line. He has more recently been extensively employed in the construction of docks. It was he who executed the Albert Dock at Leith, completed about five years ago, and he has since been engaged upon a graving-dock on the Clyde.

An Infirmary in want of Water.—The St. Olave's (Southwark) Guardians having erected an infirmary at Rotherhithe, find some difficulty in opening the building, in consequence of being unable to obtain a sufficient water-supply. They require water on the second floor at a height of 30 ft. The Southwark and Vauxhall Water Company confess that they are unable to give the supply at the height named, but offer a good one on a level with the ground. The Guardians, finding that the Company's Act requires them to provide a supply at a height of 30 ft. have appealed to the Local Government Board to compel them to provide water for the new infirmary, in accordance with their requirements.

Loan Exhibition of Railway Models and Appliances.—There is at present at the Crystal Palace an interesting collection of railway models and appliances lent for exhibition by railway engineers, inventors, manufacturers, companies, and others. In addition to the models, there are a number of pictures and drawings of engines, bridges, stations, carriages, wagons, and a complete portrait-gallery of men eminent in the history of railways, exhibited by Messrs. H. Graves, the Crystal Palace Company, and others. It includes portraits and busts of Brunel, G. Stephenson, James Watt, Sir J. Hawkshaw, T. Brassey, and C. Vignoles, C.E. The exhibition is held in connexion with the *fête* in aid of the Railway Benevolent Institution.

Margate.—The works for the extension of the jetty have been commenced. They are to be finished in about thirteen months. The aquarium sea-wall, which has cost about 8,000*l.*, and is 630 ft. long, was finished on the 9th inst., the last stone being laid by Mr. Mark Sanderson, the chairman of the directors. This wall reclaims about three acres of land. The skating-rink has been commenced, and it is to be completed in about five weeks. It will be 164 ft. by 55 ft., and will be finished with Claridge's Seyssel asphalte. A bridge will be thrown from the jetty to the sea-wall, if the Pier Company give their consent. The wall is constructed of 927 blocks, weighing on an average about seven tons each.

Another "Light" Explosion!—A gas explosion occurred on the 10th inst. in the vaults of Messrs. Lafittau & Co., wine and spirit merchants, in Apple Tree-yard, York-street, St. James's-square. The cellarman unlocked the door and struck a match, a violent explosion followed, knocking him down, burning him severely, blowing out the doors, and seriously injuring a coachman who happened to be passing. Both men were conveyed to Charing-cross Hospital. Their injuries are not expected to prove fatal.

An Aquarium for Rothesay.—The foundation-stone of the first aquarium in Scotland was laid at Rothesay on the 5th inst, by Mr. Charles Dalrymple, M.P.

The Relics from Hissarlik.—We learn from Athens that Dr. Schliemann has handed over to Photiades Bey, the Ottoman minister, the sum of 2,000*l.*, which it had been agreed the explorer should pay to the Turkish Government as an indemnity for those antiques which, in violation of his contract with the Porte, he carried away to Greece. It is also known, says the *Levant Herald*, on the best authority, that the Porte has now positively refused to allow Dr. Schliemann to complete his excavations at Hissarlik.

Strike of Masons at Ruabon.—A serious strike has taken place among the masons at the quarries of the Cefn Freestone Quarry Company, Ruabon. The men applied for an advance from 7d. to 7½d. per hour, and required to leave at noon on Saturday. These demands being refused they struck work. From this quarry most of the stone used for ornamental purposes in public buildings in North Wales and the north-west of England is taken, so that the consequence of this cessation may be serious.

Widening of Upper Thames-street.—The Commissioners of Sewers at their meeting, on the 8th inst., resolved, after some discussion, to offer the sum of 4,000*l.* for the ground required to widen Upper Thames-street, in front of All-hallows church. It was also agreed to offer 2,200*l.* for the leasehold interest in the White Hart Tavern, which will have to be pulled down in order to carry out the contemplated improvements.

Paving Works in St. Pancras.—At the meeting of the St. Pancras Highways, Sewers, and Works Committee, on the 7th inst., tenders were received for the execution of paving works in Manchester-street, Argyle-square, Charles-street, Clarendon-square (south side), Phœnix-street, and part of Great College-street. The amounts varied from 11,210*l.* down to 10,790*l.*, and the latter, that of Mr. C. D. Sewell, was accepted.

Sewerage Works at Wisbech.—A meeting of the united Board of Health was held at the Town-hall, Wisbech, on the 4th inst., under the presidency of the Mayor. The sum of 1,000*l.* was ordered to be paid to Messrs. Jas. Neave & Sons, the contractors for the sewerage works. It was stated that the cost of the sewerage works up to the present time is 46,000*l.*

Completion of a Large Viaduct.—After four years' incessant labour at the Smardale Viaduct, the Midland Railway Company can now cross the North-Eastern Railway, at an elevation of 136 ft. It is a stupendous, difficult, and expensive undertaking; and Mr. A. Wodiwiss, the contractor, has had an army of workmen engaged in the erection, who are now mostly released and engaged on other jobs.

Assistance to Architects.—The establishment which has been opened by Messrs. Foster & Riley, in London-wall, and which is constantly mentioned in our advertising columns, seems calculated to be of use to architects and others at moments of pressure. The principals appear to know what they are about, and can give useful help.

Corot.—Messrs. Cottier & Co., in their rooms, No. 8, Pall-mall, have an interesting collection (perhaps the largest ever made in England) of the works of the recently deceased French Master, Corot. It affords a good opportunity to study the characteristics and qualities of this very eminent master.

Not Wise.—We understand that the Ryde Town Council have decided that in future it shall not be obligatory on those who build semi-detached houses to carry party walls up through the roof.

Restoration of Chippenham Church.—The tender of Messrs. Smith & Light, builders, of this town, has been accepted for the enlargement and restoration of the parish church.

Burton-upon-Trent.—The building of the proposed new post-office has been let to Messrs. Lowe & Sons, whose estimate amounted to 4,800*l.*

Rochester Cathedral.—The re-opening of Rochester Cathedral took place on the 11th inst. The restoration of the interior is now completed.

Arbroath.—A new church, for the East Free Congregation, Arbroath, has been opened at Brothock Bridge. The building is divided into nave and side-aisles, and is seated for about 630 persons. Mr. W. Aitkenhead was the architect.

TENDERS

For the erection of four warehouses, in Barbican, for Messrs. Tubbs & Lewis. Mr. Coutts Stone, architect. Quantities by Mr. W. A. Dixon:—

Holland & Hannen	£13,230	0	0
Newman & Mann	13,176	0	0
Brass	12,947	0	0
Patman & Fotheringham	12,898	0	0
Browne & Robinson	12,878	0	0
Shurmur	12,393	0	0
Mark	12,160	0	0
Scrivener & White	12,101	0	0
Sharpington & Cole	11,997	0	0
Moreland & Nixon	11,995	0	0
Sewell & Co.	11,969	0	0
Coleman	11,965	0	0
Oliver	11,900	0	0
Crabb	11,900	0	0
Bangs & Co.	11,700	0	0
Elkington	11,357	0	0

For villa residence, West Drayton, for Mr. Thatcher:—

Dexter	£1,977	0	0
Taylor	1,950	0	0
Wearley	1,797	0	0
Garratt & Wilkinson	1,600	0	0

For new farm-stead, cottage, &c., at Northern Woods Wooburn, Bucks. Mr. Arthur Vernon, architect:—

Walter	£760	0	0
Taylor	740	0	0
Hook & Oldrey	747	0	0
Webb	733	0	0
Banghurst	730	10	6
Child	690	0	0
W. H. Spicer	685	0	0
Hunt	658	10	0
Sexton (accepted)	638	10	0
Bagley	616	0	0

For new free Methodist chapel and alterations, Penn, Bucks. Mr. Arthur Vernon, architect:—

Sexton (accepted)	£320	0	0

For alterations at the "Standard," Stockbridge Terrace, Pimlico. Messrs. Drury & Lovejoy, architects:—

Godden	£279	0	0
Hockly	277	0	0
Shurmur	267	0	0

For erection of villa residence at Shepherd's Bush for Mr. Joseph Woodger, jun. Mr. Alfred C. Bean, architect:—

Downs	£2,049	0	0
Warr	1,897	0	0
Eyles	1,749	0	0
Johnson	1,625	0	0
Johns & Cockell	1,200	15	6

For drainage works at Isle Grange, Hertford, for Col. Robertson. Smith & Austin, engineers:—

Potter (accepted)	£127	10	0

For schoolhouse and residence at Aberystwyth, for the Rev. Llewelyn Edwards. Messrs. Salumper & Aldwinckle, architects:—

Davies	£2,450	0	0
David Jones	1,967	0	0
David Jones	1,700	0	0
John Jones	1,650	0	0
Williams	1,570	0	0

For new workhouse at Lampeter, Cardiganshire. Messrs. Salumper & Aldwinckle, architects:—

Jones & Allen	£2,795	0	0
Williams (accepted)	2,370	0	0

For school and residence for the School Board, Llanychaiarn, Cardiganshire. Messrs. Salumper & Aldwinckle, architects:—

Evans (accepted)	£1,050	0	0

For building agent's house, farm premises, and four cottages, on the Lynford Hall Estate, for Mrs. Lyne Stevens. Mr. J. M. Anderson, architect. Quantities by Mr. S. J. Thacker:—

		Concrete and Seyssell Asphalte,
Bromwich	£13,890	£418
Saunders	12,418	555
Andrews	12,404	580
Hubbard	10,797	200

For the erection of a new warehouse and printing works at the corner of Moor-street and Albert-street, Birmingham, for Mr. Frederick Grew. Mr. W. Tadman Foulkes, architect. The quantities by Mr. W. A. Phipson:—

Smith & Son	£3,562	0	0
Cresswell & Son	3,350	0	0
Matthews	3,297	0	0
Davies Brothers	3,265	0	0
Sapcote & Son	3,219	0	0
Brooks	3,200	0	0
Hughes	3,190	0	0
Horsley Brothers	3,111	0	0
Twigg & Fowke	3,104	0	0
Steele	3,100	0	0
Bloore	3,089	0	0
Parton	2,999	10	0
Lidsey	2,889	0	0
Hartley (accepted)	2,787	0	0

For farm buildings at Blunham, Beds, for Mr. Powers. Mr. Usher, architect:—

Twelvetrees	£458	10	0
Hull	379	0	0
Lilley	355	10	0
Knight & Boston	353	10	0
Spencer (accepted)	349	10	0

For erecting a detached villa residence, at Wimbledon, for Mr. John Lockton:—

Timewell (Islington)	£850	0	0

For erecting seven small houses on freehold land, Church-row, Kensington, for Mr. George Hunt. Mr. Gordon Stanham, architect:—

Adamson & Sons	£3,200	0	0
Hockley	3,089	0	0
Stimpson & Co.	2,969	0	0
Thomas & Butland	2,876	0	0
Lucas & Son	2,600	0	0

For additional story and other works at the Devonshire Arms, Moreton-street West, Pimlico, for Mr. Hallet. Mr. George Legg, architect:—

Heath	£488 0 0
Timewell (accepted)	420 0 0

For stables and cottages, Hargwyne-street, Clapham, for Mr. Herbert Clarke. Mr. John Groom, architect. Quantities by Mr. B. A. C. Herring:—

Mills	£2,889 0 0
Deacon	2,837 0 0
Thompson	2,837 0 0
Turner & Sons	2,825 0 0
Scrivener & White	2,759 0 0
M'Lachlan & Son	2,725 0 0
Kelly Brothers	2,723 0 0
J. Orbab	2,610 0 0
J. Marsland	2,575 0 0

For erection of new school and residence at Kingston, Cambridgeshire, for the School Committee. Mr. George Eraut, architect:—

Laughton	£749 0 0
Taylor	736 0 0
Warboys	687 0 0
Ellis	644 0 0
Thoday	611 0 0

For erection of new schools at New Wimpole, Cambridgeshire, for the School Committee. Mr. George Eraut, architect:—

Taylor	£557 0 0
Laughton	550 0 0
Thoday	530 0 0

For repairs, Whittington Cottage, Highgate, for the governors of the poor of the parish of Clerkenwell:—

		Extra Plastering.
Smith	£287 0 0	£26 0 0
Smith	230 0 0	
Ebbage	198 0 0	25 0 0
Kerry	189 17 6	14 17 0
Wilcock	175 0 0	22 10 0
Sargent	155 0 0	28 0 0

For new concert hall and committee rooms for the Montague Hall Company, Worthing. Messrs. Newman & Billing, architects. Quantities supplied by Mr. Lee:—

Foster	£4,797 0 0
Downs & Co.	4,711 0 0
Stevenson	4,669 0 0
Softly	4,647 0 0
Coles	4,619 0 0
Bruton	4,551 0 0
Smith	4,296 0 0
Slewing	4,101 0 0
Patching	4,048 0 0

For new schoolroom, laundry buildings, dining-room, lavatories, &c., at the Girls' Reformatory Schools, Hampstead. Messrs. Spalding & Knight, architects. Quantities by Mr. Fleetwood:—

Burford (accepted)	£2,533 0 0

For building new wing at the London Hotel, Bournmouth, Hants. Mr. H. J. Newton, architect. Quantities by Messrs. Lamb & Church:—

Hockley	£2,341 0 0
Dove Brothers	2,295 0 0
Cooke & Green	2,283 0 0
Shurmur	2,043 0 0
Galton & Dashwood	1,992 0 0

For alterations to the "George" public-house, Waterloo-road. Mr. H. J. Newton, architect:—

Cooke & Green	£589 0 0
Godden	562 0 0
Hockley	545 0 0
Shurmur	477 0 0

For alterations to the "White Hart" public-house, Greenfield-street, Whitechapel. Mr. H. J. Newton, architect:—

Shurmur	£333 0 0
Wells	330 0 0
Taylor	319 0 0

For addition to the "Compasses" Public-house, Mount-street, Grosvenor-square. Mr. H. J. Newton, architect. Quantities by Mr. Budd:—

Cooke & Green	£450 0 0
Hockley	370 0 0
Shurmur	342 0 0

For alterations and repairs to Egypt House, West Cowes, Isle of Wight, for the Earl of Hardwicke. Mr. George Eraut, architect:—

Ball	£387 0 0

For erection of new school at Whaddon, Cambridgeshire, for the School Committee. Mr. George Eraut, architect:—

Warboys	£380 0 0
Symons	355 0 0
Reavell	350 0 0

For erection of new school at Wendy, Cambridgeshire, for the Wendy and Shingay District School Committee. Mr. George Eraut, architect:—

Saggers	£594 0 0
Symons	430 0 0
Willmot	366 0 0

For painter's work, &c., at the mansion stables, Wimpole, for the Earl of Hardwicke. Mr. George Eraut, architect:—

Thoday	£361 0 0

For new schools in Paradise-street, Gray's-inn-road, for the Home and Colonial School Society. Mr. Charles J. Shoppee, architect. Quantities by Messrs. Sydney Young & C. Herbert Shoppee:—

Patman & Fotheringham	£3,455 0 0
Jackson & Shaw	3,418 0 0
Brasher & Son	3,400 0 0
Conder	3,397 0 0
Merritt & Ashby	3,397 0 0
Campion	3,330 0 0
Bayes & Ramage	3,300 0 0
Brass	3,294 0 0
Ward	3,184 0 0
Macey (accepted)	3,166 0 0

For sundry painting works at Nos. 17 and 17½, Watling-street, for Messrs. J. Young & Son. Mr. George Barnes Williams, architect:—

Hayward & Son	£220 0 0
Mansfield & Son	197 10 0
Pitman & Cuthbertson (accepted)	184 5 0

For the erection of two houses at Harrow. Mr. Chas. Deahon, architect:—

Cox	£2,230 0 0
Board, Jopling, & Co.	2,075 0 0
Dover, Son, & Co	2,059 0 0
Hurst	2,058 0 0
Miskens	1,969 0 0
Kindell	1,798 0 0
Warr	1,797 0 0

For the erection of Rodmersham Vicarage House. Mr. W. Barber, architect:—

Cornelius	£1,947 0 0
Staines & Son	1,886 0 0
Dover, Son, & Co.	1,858 0 0
Naylar	1,859 0 0
Shrubsole	1,835 0 0
Messrs. Whiting	1,813 0 0
Harnett	1,809 0 0
Siagar	1,798 0 0
Foad	1,600 0 0

For the finishing four villas at Southend, for Mr. Venables. Mr. J. W. Dennison, architect:—

Dover, Son, & Co.	£3,450 0 0
Stainey & Bowell	2,597 0 0
Morley	2,050 0 0

For Grove-lane sewers for St. Giles's, Camberwell. Mr. Reynolds, surveyor:—

Wigmore	£3,650 0 0
Batch	3,200 0 0
Goodhem	3,097 0 0
Harris	2,987 0 0
Dover, Son, & Co.	2,935 0 0
Wainwright (accepted)	2,749 0 0

TO CORRESPONDENTS.

Mr. B.—A. A.—Thomason College.—W. W.—A. V.—T. L. D.—J. T. W.—W. G. S.—C. M. H.—J. T.—H. F.—J. G.—T. H.—F. B.—E. M.—T. W. A.—C. F.—J. W. G.—C. E. F.—J. T. M.—G. L.—H. C. N.—C. L.—G. E.—R. G. S.—J. B. A.—W. T. P.—Mr. V.—J. U.—E. M.—Mr. O.—J. B.—R. S.—H. M.—T. & B.—St. V. M.—H. J. N. & B.—Mr. S.—M. J. L.—Z. A. (no).—Mrs. C. H. S. (next week).—Annoyed (if it overhangs his ground it might be prevented; take advice on the spot).—T. W. P. (inform the insurance office; query, indict as a nuisance?).

We are compelled to decline pointing out books and giving addresses.

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and IMPROVED GATE FITTINGS of every Description.
Discount to Builders. 36A, BOROUGH ROAD,
Illustrated Sheet on application. LONDON, S.E.

CONTRACTS—*Continued from page* ii.

LONDON and NORTH-WESTERN RAILWAY.—To CONTRACTORS.—The Directors are desirous of receiving TENDERS for the WIDENING and ALTERATIONS of about 1¼ mile of the Merthyr Branch, including 650 yards of Tunnelling. Parties desirous of Tendering may see the drawings and specification, and obtain statements of quantities upon application to Mr. JOHN GARDNER, 9, Victoria-chambers, Westminster, on and after TUESDAY, 22nd JUNE, between the hours of TEN and FOUR o'clock. Tenders addressed to the undersigned at Euston Station, and marked outside "Tender for Merthyr Branch Widening," to be delivered on or before WEDNESDAY, 14th JULY, at NINE o'clock a.m. The Directors do not bind themselves to accept the lowest or any Tender. S. REAY, Secretary.
Euston Station, London, June, 1875.

IMPERIAL FIRE INSURANCE COMPANY (established 1803), 1, Old Broad-street, E.C. and 16 and 17, Pall-mall, S.W. Capital, 1,600,000l. Paid up and invested, 700,000l. Insurances against fire on property in all parts of the world at moderate rates of premium. Prompt and liberal settlement of claims. Policies falling due at MIDSUMMER should be renewed before the 9th of JULY, or the same will become void.
E. COZENS SMITH, General Manager.

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